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UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

FEBRUARY, 1883.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY.

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WASHINGTON:
OFFICE OF THE CHIEF SIGNAL OFFICER.
1883.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Monthly Weather Review for the month of February, 1883.
(Arranged alphabetically.)

Nationality.	Rig.	Name of vessel.	Name of observer, with title.
		Allan Line.	
British	Steamship.	Circassian	Captain W. H. Smith.
	Do	Manitoban	" A. Macnicol.
	Do	Nova Scotian	" W. Richardson.
	Do	Scandinavian	" John Park.
		American Line.	
	Do	British Crown	" E. H. Freeth.
American	Do	Illinois	" Shackford.
	Do	Indiana	" R. W. Sargent.
British	Do	Lord Clive	" P. Urquhart.
	Do	Lord Gough	" E. M. Hughes.
American	Do	Ohio	" Henry Morrison.
	Do	Pennsylvania	" Geo. H. Dodge.
		Amsterdam Line.	
Dutch	Do	Jason	" D. H. Hinlopen.
	Do	Stella	" W. J. C. Ten Harmsen.
		Anchor Line.	
British	Do	Anchoria	" John Hedderwick.
	Do	Assyria	" James Brown.
	Do	Bolivia	" James Donaldson.
	Do	Dorian	" G. Mitchell.
		Atlantic Transportation Company.	
	Do	Surrey	" Rowland Hill.
		Atlas Line.	
	Do	Ailsa	" J. W. Sansom.
	Do	Antillas	" R. de Echevarrieta.
		Beaver Line.	
	Do	Lake Huron	" William Bernson.
		Booth's Steamship Company, (limited.)	
	Do	Ambrose	" Edw. Bisson.
		California and Mexican Steamship Co.	
American	Do	Mexico	" Thomas Huntington.
		Cunard Line.	
British	Do	Bothnia	" Wm. McMickan.
	Do	Gallia	" W. H. P. Hains.
	Do	Parthia	" Henry Walker.
	Do	Pavonia	" Horatio McKay.
		General Trans-atlantic Steamship Co.	
French	Do	Canada	" E. Frangeul.
	Do	Labrador	" Adéa Servan.
	Do	Péreire	" C. Berry.
	Do	Ville de Marseille	" Tal. Cabour.
		Guion Line.	
British	Do	Abyssinia	" Edw. Bentley.
	Do	Arizona	" Sam. Brooks.
	Do	Wyoming	" J. Douglas.
		Hamburg-American Line.	
German	Do	Bohemia	" O. Pezoldt.
	Do	Rugia	" A. Albers.
	Do	Silesia	" C. Kordell.
	Do	Vandalia	" R. Karlowa.
	Do	Wieland	" C. Hebich.
		Inman Line.	
British	Do	City of Berlin	" R. Leitch.
		Lampert and Holt's Steamship Co.	
	Do	Hevelius	" John Carroll.
	Do	Ptolemy	" Arthur W. Jeffery.
		Leyland Line.	
	Do	Bulgarian	" E. Parry.
	Do	Virginian	" M. Fitt.
		Mediterranean and N. Y. Steamship Co.	
Italian	Do	Archimede	" Domenico Viola.
British	Do	Picqua	" William Clayton.
		Merchants' Express Company to Havre.	
Danish	Do	Hermod	" V. T. Hein.
		Merchants' & Miners' Transportation Co.	
American	Do	Alleghany	" W. A. Hallett.
		Miss. & Dominion S. S. Co., (limited).	
British	Do	Brooklyn	" H. C. Williams.
	Do	Dominion	" Joseph Gibson.
	Do	Toronto	" Joseph Gibson.
		Morgan's La. & Texas Steamship Co.	
American	Do	Chalmette	" Fred. Read.
	Do	Lone Star	" R. B. Quick.
	Do	New York	" H. S. Quick.
		National Line.	
British	Do	Denmark	" Wm. Tyson.
	Do	England	" T. P. Heeley.
	Do	Greece	" W. Pearce.
	Do	Helvetia	" Robt. P. Williams.
	Do	The Queen	" Geo. Cochrane.
		New York & Cuba Mail Steamship Co.	
American	Do	Santiago	" F. M. Faircloth.
		N. Y., Havana & Mexican Mail S. S. Co.	
	Do	City of Merida	" Wm. M. Rettig.
	Do	City of Washington	" J. W. Reynolds.
		North German Lloyd.	
German	Do	America	" F. Hamelmann.
	Do	Braunschweig	" C. Pohle.
	Do	Donau	" R. Ringk.
	Do	Elbe	" W. Willigerod.
	Do	General Werder	" H. Christoffers.
	Do	Habsburg	" F. Himbeck.
	Do	Hohenstaufen	" Th. Jüngst.
	Do	Main	" O. Heimbruch.
	Do	Neckar	" Rich'd Bussius.
	Do	Oder	" Carl Undeutsch.
	Do	Weser	" H. Bruns.
		N. & S. American Steam Navigation Co.	
	Do	Claudius	1st Officer G. Blumberg.
		Occidental and Oriental Steamship Co.	
British	Do	Belgic	Captain John G. Cameron.
	Do	Gaelic	" W. A. Turpin.
		Ocean Steamship Company.	
American	Do	City of Augusta	" R. S. Nickerson.
		Oregon Improvement Company.	
	Do	Mississippi	" E. W. Holmes.
	Do	Willamette	" L. Meyer.
		Oregon Railway and Navigation Co.	
	Do	Columbia	" Fred. Bolles.
	Do	Oregon	" E. Polemann.

Nationality.	Rig.	Name of vessel.	Name of observer, with title.
		Pacific Coast Steamship Company.	
American	Steamship.	Ancon	Captain John N. Ingalls.
	Do	Orizaba	" Chas. B. Johnson.
	Do	Queen of the Pacific	" E. Alexander.
	Do	State of California	" G. Debney.
		Pacific Mail Steamship Company.	
	Do	City of New York	" W. B. Cobb.
	Do	City of Rio de Janeiro	" W. B. Seabury.
	Do	City of Tokio	Commodore Jefferson Maury.
	Do	Colon	Captain S. Grosvenor Porter.
	Do	Granada	" M. Connolley.
	Do	Zealandia	" Henry Webber.
		Quebec Steamship Company.	
British	Do	Muriel	" G. S. Locke.
		Red "D" Line.	
American	Do	Caracas	" W. M. Hopkins.
	Do	Valencia	" Samuel Hess.
		Red Star Line.	
Belgian	Do	Belgenland	" Joseph Stokes.
	Do	Nederland	" J. Ueberweg.
	Do	Pennland	" R. Weyer.
	Do	Rhynland	" J. C. Jamison.
	Do	Waesland	" H. Nickels.
	Do	Zeeland	" H. Bushman.
		Rotterdam Line.	
Dutch	Do	Leerdam	" P. Stierendregt.
	Do	Rotterdam	" S. Kryt.
	Do	Schiedam	" J. d'Harnecours.
	Do	W. A. Scholten	" G. I. Vis.
		State Line.	
British	Do	State of Florida	" D. H. Johnston.
	Do	State of Georgia	" G. Moodie.
	Do	State of Indiana	" John W. Sadler.
		Texas Line.	
American	Do	Colorado	" M. B. Crowell.
	Do	Rio Grande	" A. C. Burrows.
	Do	San Marcos	" Jas. Bolger.
		Warner and Merritt Line.	
	Do	D. J. Foley	" Chas. B. Dickman.
		Warren Line.	
British	Do	Iowa	" Samuel Walters.
		White Cross Line.	
Belgian	Do	Daniel Steinmann	" H. Schoonboven.
		White Star Line.	
British	Do	Adriatic	" J. W. Jennings.
	Do	Baltic	" H. Parsell.
	Do	Britannic	" H. Perry.
	Do	Celtic	" Benj. Gleadell.
	Do	Republic	" P. J. Irving.
		Wilson Line.	
	Do	Marengo	" J. H. Malet.
	Do	Romano	" Richard Potter.
	Do	Salerno	" E. E. Wilson.
		Winsor Line.	
American	Do	Aries	" H. W. Googins.
	Do	Catherine Whiting	" John Horton Briggs.
	Do	Norman	" P. A. Nickerson.
	Do	Saxon	" S. W. Snow.
		Miscellaneous.	
Spanish	Do	Antonio Lopez	" Eugenio Bayona.
British	Do	Archimedes	" Jos. P. Davies.
	Do	Benledi	" James Ross.
	Do	Burswell	Chief Officer L. P. Nelson.
	Do	Foccolia	Captain James Wallace.
American	Do	Laurel	" P. L. Cosgrove.
British	Do	Madrid	" M. Garson.
American	Do	Raleigh	Chief Officer Rich'd Zolling.
		"New York Herald Weather Service."	
American	Do	Acapulco	Captain W. G. Shackford.
Dutch	Do	Amsterdam	" Th. M. Lucas.
British	Do	Catalonia	" Wm. Gill.
	Do	City of Richmond	" Fred Watkins.
	Do	City of Chester	" Fred Watkins.
	Do	Spain	" R. W. Grace.
	Do	State of Nebraska	" A. G. Braes.
		Sailing vessels.	
American	Brig	Abbie Clifford	" David W. Storer.
	Schooner	Abbie H. Gheen	" W. W. Gheen.
	Brig	Belle of the Bay	" R. O. Welton.
British	Bark	Bonny Doon	" J. S. Cole.
German	Do	Bremen	" Alfred Lietke.
American	Barkentine	C. S. Bushnell	" Jos. F. Mayo.
German	Ship	Cornelius	" H. Windhorst.
American	Schooner	Edith R. Seward	" Wilbur K. Tall.
British	Ship	E. J. Spicer	" Geo. L. Spicer.
	Brig	George	" Wm. H. Champlin.
American	Do	Gipsey Queen	" W. Chandler.
	Bark	Grey Eagle	" Judah Berry, jr.
	Schooner	Hattie Weston	" D. H. Craig.
German	Bark	Heinrich & Tonio	" L. Meyer.
American	Ship	Henry Failing	" Jacob Morriman.
	Schooner	Isabel Alberto	" E. F. Bishop.
	Do	John L. Thomas	" S. F. McLeod.
	Brig	John Wesley	" John H. Hines.
	Do	L. & W. Armstrong	" Albion Alexander.
British	Bark	Mary A. Troop	" Victor I. Young.
American	Ship	M. F. Grace	" R. P. Wilbur.
British	Bark	Matilda C. Smith	" E. C. Smith.
American	Schooner	Minnie A. Bonsall	" J. L. Bonsall.
	Bark	Norena	" A. B. Chase.
Danish	Schooner	Ocean Traveller	" C. W. Brown.
American	Ship	Paramita	" A. Humphrey.
	Schooner	Pearl Nelson	Mate S. John Kuno.
	Bark	Reindeer	Captain C. V. Decker.
German	Do	Rudolph	" I. W. Hilgerloh.
American	Schooner	S. B. Hubbard	2d Mate A. R. Mehaffey.
Norweg'n	Bark	Saga	Captain O. P. Sövig.
American	Do	Scud	" John F. Sawyer.
British	Do	Southern Belle	" Geo. D. Fraser.
American	Do	Sunbeam	" Joseph Hand.
Italian	Do	Vincenzo Accame	Capt. N. Vincenzo Lavagna.
American	Do	Viola Reppard	Captain Lewis Ogier.
	Schooner	Wm. Wiler	" John H. I. Donahoe.

MONTHLY WEATHER REVIEW.

VOL. XI. WASHINGTON, D. C., FEBRUARY, 1883. No. 2.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological reports received from the regular and voluntary observers of the Signal Service during the month of February, and up to March 20th. A brief description is also given of storms which occurred in the north Atlantic during the month, based upon observations taken at 7 a. m., Washington time.

The most marked features of the month have been:—

1st. The destructive floods which occurred in the Ohio and its tributaries, causing great loss of life and property. The water in the Ohio, near Cincinnati, Louisville, and southward to Cairo, rose above the highest water-mark of any previous flood, and the value of property destroyed is estimated at $30,000,000. The floods in the lower Mississippi had not reached their maximum height at the close of the month, but in many places they have equalled the floods of last year. The warning issued by this service gave from ten to fifteen days' notice of the approach of these floods, and the citizens in the threatened district had ample time to secure property and seek places of safety.

The following note, relative to the work of the Signal Service, appeared in the "Cincinnati News" of February 17:—

The United States Signal Service Department has been of great service during the flood, more so, in fact, than the majority of our citizens are aware of, and their timely warnings of the coming flood have been instrumental in saving over $1,000,000 worth of goods in this city alone. Each rise has been prophesied from twelve to twenty-four hours in advance of its arrival, and the merchants promptly notified, thus enabling them to remove to a place of safety. We are pleased to learn that those most benefited by these admonitions recognize their value, and fully appreciate the services rendered. Mr. E. B. Dunn, the officer in charge in this city, has worked diligently to place his bulletins before the public, which, we are assured, has proved a very difficult undertaking, and to him the merchants of the city have tendered their heartfelt thanks.

2d. The month has been colder than the mean for February in all sections west of the Mississippi river, the severest weather occurring in the Rocky mountains and northern plateau regions, where the temperature has averaged from eight to sixteen degrees below the normal for the month.

It averaged about four degrees below the normal in the northwest and in the upper lake region, and from four to five degrees below in Oregon and California. In New England, and thence westward to Lake Erie, the temperature has been slightly below the mean.

In the southern states east of the Mississippi river, it has been warmer than usual, the greatest excess occurring in Florida, where it averaged six and five tenths degrees above the mean.

The winter has been colder than usual generally throughout the United States, the exceptions being in the south Atlantic and east Gulf states, and on the south Pacific coast, where it was slightly warmer than usual. In the northwestern sections the temperature was over four degrees below the average winter temperature.

3d. The rainfall on the Pacific coast during the past winter has not been sufficient to assure a medium wheat crop in that region. There has been a deficiency of over four inches in central California and Oregon during February, and larger deficiencies in these sections during the previous winter months. This important crop, therefore, depends largely upon the spring rains, which, in that section, are usually very light.

The rainfall in the northern states has been generally above the average, the greatest excess above the average being 3.86 inches in the Ohio valley.

4th. On chart ii. is exhibited the limits within which ice has been observed from vessels in the north Atlantic during the month of February. The reports show that ice dangerous to shipping is slowly drifting southward between latitudes n. 43° and 51° and longitudes w. 45° and 48°. Within this region many icebergs and large fields of ice were observed, and vessels approaching or leaving the coast of the United States can only avoid danger by sailing over a course south of the 40th parallel when west of the 30th meridian.

In the preparation of this REVIEW, the following data received up to March 20th, have been used; viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-six Signal Service stations and thirteen Canadian stations, as telegraphed to this office; one hundred and eighty-seven monthly journals, and one hundred and seventy-six monthly means from the former, and thirteen monthly means from the latter; two hundred and twenty-eight monthly registers from voluntary observers; fifty-one monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather-reports from the local weather services of Indiana, Kansas, Nebraska, Missouri, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches.*]

The distribution of the mean atmospheric pressure for the month of February, 1883, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines, in red, on chart iii.

The area of mean high pressure which was central in northern California and Nevada during January has apparently moved northward and now extends over Oregon and Washington Territory, the pressure, however, increased about four hundredths of an inch during the month at the centre of the high area. The area of lowest mean pressure extends over the southern part of Arizona, where the barometer ranges below 30.05. A comparison of chart iii. for this and the preceding month (January) shows that there has been a general movement of the high and low areas of pressure to the northward. The pressure has averaged about 30.25 over the greater portion of the United States, and compared with the preceding month, there has been a general increase of mean pressure in all districts except on the south and central Pacific coasts, where it has decreased.

DEPARTURES FROM THE NORMAL COMPARED WITH THE MEAN OF FEBRUARY.

The pressure has averaged more than two-tenths of an inch above the normal in the upper Mississippi and Missouri valleys, and in the northern plateau region. It has averaged more than one-tenth above the normal in the districts east of the Mississippi river, except in Florida, where it is slightly above the normal. On the Pacific coast, the pressure increases with the latitude, it being one-tenth above the normal in Washington Territory, and five-hundredths of an inch below in southern California.

BAROMETRIC RANGES.

The monthly barometric ranges have been greatest in the northern plateau and north Pacific coast region, in the upper Mississippi and Missouri valleys, and in New England. They have been least in the south Atlantic and east Gulf states, and in the southern plateau.

The following are the greatest monthly ranges reported: Umatilla, Oregon, 1.55; Lewiston, Idaho, 1.52; Eastport, Maine, 1.40; Dayton, Washington Territory, 1.38; Leavenworth, Kansas, 1.38; Omaha, Nebraska, 1.36; Yankton, Dakota, 1.33, record from 10th to 28th; Portland, Maine, 1.32; Boston, Massachusetts, 1.31; Portland, Oregon, 1.30.

The least monthly ranges are: Key West, Florida, 0.34; Punta Rassa, Florida, 0.44; Charleston, South Carolina, 0.50; Jacksonville, Florida, 0.51; Savannah, Georgia, 0.53; Cedar Keys, Florida, 0.53; Atlanta, Georgia, 0.58; Augusta, Georgia, 0.59; Smithville, North Carolina, 0.60; Fort Grant, Arizona, 0.62; Fort Macon, North Carolina, 0.64.

In the several districts, the monthly ranges have varied as follows:—

New England.—From 1.15 at New Haven, Connecticut, to 1.40 at Eastport, Maine.

Middle Atlantic states.—From 0.86 at Lynchburg, Virginia, to 1.19 at Albany, New York.

South Atlantic states.—From 0.50 at Charleston, South Carolina, to 0.79 at Kittyhawk, North Carolina.

Florida peninsula.—From 0.34 at Key West to 0.53 at Cedar Keys.

Eastern Gulf.—From 0.67 at Pensacola, Florida, to 0.92 at Vicksburg, Mississippi.

Western Gulf.—From 0.69 at Port Eads, Louisiana, to 1.16 at Fort Smith, Arkansas.

Rio Grande valley.—From 0.88 at Brownsville, Texas, to 1.11 at Eagle Pass, Texas.

Ohio valley and Tennessee.—From 0.72 at Chattanooga, Tennessee, to 1.11 at Champaign, Illinois.

Lower lakes.—From 0.91 at Cleveland, Ohio, to 1.19 at Oswego, New York.

Upper lakes.—From 0.94 at Port Huron, Michigan, to 1.19 at Escanaba, Michigan.

Extreme northwest.—From 0.95 at Bismarck, Dakota, to 1.21 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From 1.07 at Cairo, Illinois, and 1.08 at Saint Paul, Minnesota, to 1.29 at Des Moines, Iowa.

Missouri valley.—From 1.08 at Fort Bennett, Dakota, to 1.38 at Leavenworth, Kansas.

Northern slope.—From 0.87 at Fort Shaw, Montana, to 1.24 at North Platte, Nebraska.

Middle slope.—From 0.93 on the summit of Pike's Peak, Colorado, to 1.34 at West Las Animas, Colorado.

Southern slope.—From 0.81 at Fort Davis, Texas, to 1.21 at Fort Sill, Indian Territory.

Southern plateau.—From 0.62 at Fort Grant, Arizona, to 0.88 at Santa Fé, New Mexico, and 0.88 at El Paso, Texas.

Middle plateau.—From 1.16 at Pioche, Nevada, to 1.17 at Salt Lake City, Utah.

Northern plateau.—From 1.09 at Eagle Rock, Idaho, to 1.55 at Umatilla, Oregon.

North Pacific.—From 1.12 at Roseburg, Oregon, to 1.30 at Portland, Oregon.

Middle Pacific.—From 1.01 at San Francisco, California, to 1.08 at Red Bluff, California.

South Pacific.—From 0.69 at San Diego, California, to 1.03 at Visalia, California, and 1.06 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

Eight areas of high barometer have been sufficiently well marked as to render it possible to locate the centre of each at the successive morning reports from the date of first appearance until each high area had passed beyond the limits of the stations, or disappeared. These areas were generally first observed as cold waves in British America, west of the Hudson's bay region, and they moved in a south or southeast course until the centre of greatest pressure reached the Mississippi valley. Two of these areas moved southward to the west Gulf and disappeared. One was last observed in Tennessee, but was immediately followed by the development of a second high area in the northwest without the usual low area preceding it.

Those traced as far eastward as the Atlantic coast were forced to the east or north of east as they approached the coast-line. The only exception to this occurred on the 23d and 24th, when high-area vi. passed over Canada to the southeast, but the observation made on the 25th showed that the course was changing toward the east as it advanced.

I.—The month opened with this area central near Lake Winnipeg, the temperature being 35° below zero at Saint Vincent, Minnesota; Fort Garry, and Minnedosa, British America, on the morning of the 1st. This area remained nearly stationary until the morning of the 3d, the lowest temperature occurring on the morning of the 2d, when it fell to —40° at Fort Garry and —38° at Saint Vincent and Minnedosa, with barometer readings ranging from 30.80 to 30.93. An extended low area developed over the southern plateau region on the 1st and 2d, when these two conditions included within their limits the entire territory of the United States. On the morning of the 2d, the barometer rose above 30.60 in the middle and New England states, and it exceeded that in the northwestern sections of the country. The isobars of 30.50, 30.40, and 30.30 were traced from the south Atlantic coast to the north Pacific coast; and those of 30.20, 30.10, 30.00, and 29.90 from the Gulf coast to the California coast around the low area which was central in Arizona. Snow occurred during the 2d, in the lake region and thence westward to Colorado and Montana, and heavy rains fell in the Mississippi valley. The formation of an extended trough of low pressure, which extended northeastward toward Lake Ontario, apparently retarded the movement of this area until the 3d, when it moved rapidly southward to the lower Missouri valley, where it was central on the morning of the 5th. The course changed to easterly on the 5th, and it passed over the Ohio valley and middle Atlantic states, disappearing to the east of the coast-line during the 6th. A severe norther occurred in Texas on the 3d and 4th, the wind reaching a velocity of forty-three miles per hour at Galveston and thirty-five miles per hour at Indianola, attended by sleet at the point last named, where the temperature fell 50° in sixteen hours. The sudden changes in temperature attending this norther are indicated by the following reports made at 3 p. m. of the 3d: Memphis, Tennessee, 76°; Little Rock, Arkansas, 38°; Fort Smith, Arkansas, 16°; Denison, Texas, 4°; Fort Supply, Indian Territory, 4°; Indianola, Texas, 76°; San Antonio, Texas, 35°. The unusual feature of this cold wave was that while it caused freezing weather in the Gulf states, the cold did not extend eastward as is usual for similar changes of temperature. This was doubtless due to the easterly course of the high area over the Ohio valley.

II.—This was a well-marked area of high pressure central in Nebraska on the morning of the 7th. It moved southeastward to southern Missouri, causing freezing weather in the northern part of the Gulf states, and a light norther in Texas on the night of the 7th. During the 8th, the centre remained near Cairo, but by the morning of the 9th, the barometer had risen about two-tenths of an inch in the northwest, and the centre of greatest pressure had passed northwestward to a point near Yankton, Dakota. The temperature continued below zero at the most northerly stations, while this area passed westward

over the lake region and Saint Lawrence valley during the 9th and 10th. The pressure increased as the centre of this area moved eastward, and upon reaching the Saint Lawrence valley the barometric pressure was above 30.70. The lowest temperature observed during the transit of this high area, was —35° at Fort Garry, Manitoba, on the morning of the 9th. It fell to —32° at Rockliffe, Ontario, on the 10th. After passing over New England attended by cold, clear weather, on the 10th, the course changed to the northeast, and it disappeared to the northeast of the Maritime Provinces on the 11th.

III.—This was an area of slight energy which developed in the Platte river valley on the 11th. It moved directly eastward, the pressure increasing three-tenths of an inch during the 11th, and about one-tenth during the 12th, when it was central in the middle Atlantic states. On the following day it disappeared to the east of the coast-line, followed by heavy rains, north of the Ohio valley, and light rains in the southern states.

IV.—Approached the stations from British Columbia, finally extending over all of the Pacific coast districts and eastward as far as Dakota, where it was central in the upper Missouri valley on the 16th. At the morning report of this date, the temperature ranged from 15° to 20° below zero, with the barometer reading 30.50 in the region of greatest cold. During the succeeding four days, this cold wave moved directly southeast, preceded by very heavy rains in the southwest, a violent norther on the Gulf coast on the 17th and 18th, and freezing weather as far south as Indianola and Galveston, Texas, and Vicksburg, Mississippi. The wind reached a velocity of sixty miles per hour at Indianola; fifty-nine at Galveston; and thirty-eight miles at Port Eads, Louisiana. The centre was near Cairo, Illinois, on the 19th, where the pressure was 30.66. The barometer fell slowly during the succeeding day, and this high area disappeared without passing beyond the limits of the stations of observation.

V.—This area followed immediately to the west of number iv., approaching from the same region, passing over almost the same track, and, in like manner, disappeared within the limits of the stations. It moved with slight energy, the pressure decreasing from the date of its first observation until its limits were no longer traced by the isobarometric lines.

VI.—This is marked as the most northerly area of high pressure traced during the month. The greatest pressures attending this disturbance were not observed at the northwest Signal-Service stations, as it advanced from the region west of Hudson's bay southeastward over Canada and thence over northern New England to the Atlantic. It extended over the northern states on the 22d and 23d, the pressure increasing to 30.70 and the temperature falling about 20°. At Rockliffe, Ontario, the temperature fell to —27° on the morning of the 24th, and it was generally below zero at stations in northern New England and northern New York. Fair weather attended this cold wave, the only precipitation being the light snows which occurred at the immediate coast stations, when the cold fresh to brisk winds occurred in the Gulf. The temperature changes were gradual, and generally fair weather prevailed at stations within the limits of this area during the last three days of the month. At the midnight report of the 28th, the centre had passed to the south of the Gulf coast and the temperature was rising at all stations, attended by clear weather and south to west winds.

AREAS OF LOW BAROMETER.

Ten areas of low barometer have been traced over the regions occupied by the Signal-Service stations during the month. All depressions traced to the eastern portion of the continent passed over the Saint Lawrence valley from the westward, and in no case has the centre of any depression passed to the south of the Ohio valley or middle states. Two areas, ii. and iv., appear to have been secondary depressions, developing, as noted on chart i., while the first disturbance observed was central in the Rocky mountain region.

The following table shows the latitude and longitude in which each depression was first and last observed, and the hourly velocity of each depression within the limits of the stations of observation:—

Areas of low barometer.	First Observed.		Last Observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I.	39 00	119 00	37 00	111 00	21
II.	34 00	95 00	45 00	66 00	41
III.	34 00	114 00	37 30	102 00	40
IV.	39 00	87 00	47 00	63 00	54
V.	53 00	99 00	43 00	62 00	46
VI.	45 00	127 00	51 00	61 00	33
VII.	37 00	102 00	44 30	83 00	33
VIII.	47 30	94 00	46 00	62 00	37.5
IX.	29 00	100 00	51 00	66 00	19
X.	51 00	92 00	43 00	67 00	40
Mean hourly velocity					36.4

In the following table is given the number of areas of low pressure traced during the month of February, since 1874:—

Month.	Year.	Number.	Month.	Year.	Number.
February	1874	12	February	1879	9
Do.	1875	14	Do.	1880	15
Do.	1876	10	Do.	1881	10
Do.	1877	12	Do.	1882	11
Do.	1878	12	Do.	1883	10

I.—On the 1st of February the pressure was six-tenths of an inch below the mean of the month, at Pioche, Nevada, and from three to five-tenths below the mean, in California, Arizona, and Utah, while it was about as much above the mean at the northern stations. This depression moved slowly to the eastward during the 1st and 2d, but on the 3d, low-area ii. developed to the eastward, in Texas, and the barometer rose slowly at the centre of low-area i., causing it to disappear on the 3d, near the point where it was first observed.

II.—As previously stated, this depression formed in Texas, while the barometer was low to the westward. On the morning of the 3d, the centre of disturbance was located near Saint Louis, although the wind-direction gave no definite indications of a cyclonic movement of the atmosphere. The high area was advancing rapidly from the northwest, and the cold air meeting the moist air from the Gulf caused heavy snows and rains on the margin of the cold wave which, on the 3d, extended from the lower lake region to southwestern Texas. On the afternoon of the 3d, the depression was well defined, central in the Ohio valley, and by midnight it had become more contracted, the cold air from the west apparently crowding the isobarometric lines on the west quadrants of the storm. It was most clearly defined on the morning of the 4th, almost circular in form, and central near Montreal, Canada, enclosed by the isobars of 29.80 and 29.70. The course changed to the east at this report, and when last observed, it was apparently losing energy, although the pressure was decreasing at the centre of disturbance. This storm was most violent when it was nearest the cold wave which followed. The rainfall being very great in the Ohio valley on the 4th, and the snow in the lake region and Saint Lawrence valley, interrupted railroad communication.

III.—This depression was central in southern California at the midnight report of the 5th, and it moved with but slight energy to eastern Colorado during the 6th. Light snow and rain fell in Arizona and Nevada, and rain in California, on the 6th. The afternoon report of this date showed a depression central in eastern Colorado, the barometer being highest on the middle Atlantic coast, with snow or rain prevailing from the Atlantic coast westward to the Rocky mountains. A slight depression was observed in the Ohio valley, while the area of least pressure was located in Colorado. This area disappeared suddenly on the night of the 7th, the barometer at West Las Animas, near the centre, rising from 29.86 to 30.23 in eight hours. Cautionary signals were displayed in advance of the storm at stations on the Atlantic coast north of Hatteras, North Carolina, but

the most violent winds occurred after the storm-centre had passed the coast-line.

IV.—Developed in the Ohio valley on the afternoon of the 6th, as a secondary depression, the barometer being lowest in Colorado. It passed to the northeastward over the lower lake region and northern New England, causing rain and snow in the northern states east of the Mississippi, and general rains in the southern states during the 6th and the morning of the 7th. It disappeared to the northeast of New England, where the barometer was unusually low on the afternoon of the 7th.

V.—This was a slight depression which advanced from the region near Lake Winnepeg on the 10th, following a southeasterly course over the north portions of the lake region, and crossing the Saint Lawrence river near Montreal on the 11th. Light snows occurred in the northern districts, but the disturbance developed only slight energy until it had reached the Atlantic in the vicinity of Halifax, Nova Scotia, when the wind shifted to northwesterly on the New England coast with increasing force. The following maximum wind-velocities were reported: Barnegat City, New Jersey, 52 miles, nw.; Hatteras and Kittyhawk, North Carolina, 44, ne.; Sandy Hook, New Jersey, 43, nw.; Block Island, Rhode Island, 46, n. After passing east of the coast, this storm apparently moved in a northeast direction, following the general course of north Atlantic storms.

VI.—Developed in western Kansas during the night of the 13th, while an extensive depression was present on the Pacific coast. It became well defined during the 14th, and moved in a northeasterly direction over Missouri, Iowa, and the upper lake region, causing light rain in all districts south of the lake region, and snow in New England and at the northern stations as far west as the Missouri valley on the 15th. It disappeared when near lake Huron, probably joining the low area which followed immediately to the west.

VII.—This is the only storm occurring during the month which has been traced from the Pacific coast eastward across the Rocky mountains to the Atlantic. General rains prevailed on the Pacific coast during the 13th and 14th, while this disturbance was advancing from the Pacific to the coast of Oregon. The easterly movement was apparently retarded until the centre of disturbance had passed to the east of the coast, when the velocity increased rapidly, causing the storm-centre to pass from Oregon to Colorado in twenty-four hours. The afternoon reports of the 15th placed the centre of this disturbance in eastern Colorado, the most southerly point of the storm's track. The course changed to the northeast, and during the night of the 15th, and on the following day, the weather was decidedly stormy in the lake region and northwest. The cold wave which followed the storm caused a rapid increase of the barometric gradient in the west quadrants of the storm, and the sudden changes of temperature which occurred are indicated by the north and south directions of the the isothermal lines in the Mississippi valley on the 16th. After passing over the upper lake region the storm followed the general course of the Saint Lawrence valley, and disappeared to the east. It was most severe while passing from the upper Mississippi valley over the upper lake region.

VIII.—Apparently developed in Minnesota during the night of the 19th. It moved eastward over Lake Superior to the upper Saint Lawrence valley on the 20th, increasing in energy and becoming more contracted. This disturbance, however, did not effect the weather in the United States, generally, but light snow occurred in the northern portions of the middle and New England states and at stations in the lake region as the storm-centre passed over these districts. After crossing the Saint Lawrence river, the storm-track inclined to the north of east, and the barometer fell rapidly after the centre passed east of the coast-line.

IX.—This disturbance was observed in southern Texas on the morning of the 23d, although the reports of the 22d showed that a storm was slowly developing in that region. Heavy rains occurred in the southern states during the 23d as the storm passed northeastward over Texas, and in the Ohio valley and upper Mississippi and lower Missouri valleys on the 24th. The morning reports of the 24th showed the centre of disturbance to be in southern Missouri, and on the following morning it had passed over Lakes Michigan and Huron. It increased greatly in energy during the 24th, causing heavy rains and high winds in the south and middle Atlantic states and lake region, and snow and sleet in the northwest, where cold, freezing weather quickly followed. This was probably the most severe storm of the month, and the floods in the lower Mississippi were greatly increased by the heavy rains which fell during the 23d and 24th. After passing the lake region, the barometer fell to 29.30 near the centre of disturbance, and violent gales occurred at stations northeast of New England. The gales continued until the 27th, accompanied by very cold weather. This storm was last located on the night of the 25th north of Gaspe or Father Point.

X.—This was a slight disturbance which passed eastward north of the lake region on the last day of the month. It was first observed north of Duluth, Minnesota, on the morning of the 27th, and moved in a southeasterly course over New England to the Atlantic, when its course became easterly, and it disappeared without causing any marked change of weather in the United States. Light snow fell in New England during the morning of the 28th, but the weather cleared in that region during the day, and the month closed with unusually clear weather in all districts.

NORTH ATLANTIC STORMS DURING FEBRUARY, 1883.

[*Pressure expressed in inches and in millimeters; wind-force by scale of* 0—10.]

Chart ii. exhibits the tracks of the principal storms that have occurred over the north Atlantic ocean during February, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to March 21st. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. Greenwich mean time.

Ten depressions have been traced across the Atlantic; these have moved with more or less rapidity in the usual northeasterly track, but, owing probably to the prevalence of high barometric readings over western Europe, the storm-centres appear to have passed northeastward at some distance from the coasts of the British Isles, but generally sufficiently near to affect the meteorological conditions over those islands. From the 1st to the 15th of February, the weather in the north Atlantic was characterized by a succession of violent and dangerous gales; the depressions numbered iii., iv., v., and vi., caused unusually heavy gales, especially number vi., which exhibited the violence of a tropical hurricane. After the 20th, an area of high pressures apparently spread over the ocean, and the depressions charted after that date appear to have been shallow, and did not develop any unusual energy; the winds diminished in force and generally cloudy weather prevailed till the end of the month.

The following descriptions relate to the storms traced on the chart:—

I.—This was probably a continuation of the storm traced as number xi., of the January chart. On January 31st, the depression was apparently central near N. 47°, W. 37°; it moved eastward and on the 1st, the centre was near N. 48°, W. 20°. Captain Wilson, of the s. s. "Salerno," in N. 49°, W. 22°, reported: January 31st, at 8 p. m., barometer began to fall very rapidly; wind backing to sw. and s. and blowing a heavy gale; at midnight it fell calm with very heavy sea running. On February 1st, at 4 a. m. (in about N. 49° 10′, W. 21° 40′), the wind came suddenly from the eastward and continued to blow a furious gale, gradually hauling to ne., n. and nw., the sea blowing over the ship in a continuous sheet of water. As the wind shifted, the barometer began to rise and the wind and sea moderated. On the 2d, the depression was central south of Ireland, and in connection therewith, very strong gales,

with rain, occurred over the Bay of Biscay and the English Channel.

II—This disturbance was central over the Gulf of Saint Lawrence on the morning of the 1st. It passed eastward over Newfoundland, and on the 2d, it was shown near N. 50°, W. 43°; on that date, the s. s. "Lake Huron," in N. 45° 53′, W. 42° 45′, reporting barometer 29.56 (750.8), being a fall of .53 inch in twenty-four hours; wind w., force 8. The depression moved east-northeastward, and on the 3d, was central near N. 52°, W. 29°, the s. s. "State of Florida," in N. 52° 19′, W. 21° 58′, reporting barometer 29.39 (746.5), wind ssw., force 8, overcast, ten hours heavy rain. The barometer rose very slowly after the passage of the storm-centre, and vessels between the thirtieth and fortieth meridians reported generally low barometer, with snow and sleet. During the 3d, the depression moved somewhat slowly northeastward, with gradually decreasing pressure, and on the 4th, the centre was near N. 52°, W. 32°. The s. s. "Lord Clive," in N. 51° 25′, W. 25° 20′, reported: at 0. 8m., Greenwich mean time, barometer 29.24 (742.7), wind nw., force 4; at 9.32 p. m., the barometer read 29.15 (740.4), which was the minimum reading, wind light and unsteady. After midnight, the barometer began to rise, and a high sea from the s. and ssw. was experienced, with passing showers of rain. Captain Scott, of the s. s. "Plantyn," reported: noon, (ship's time,) in N. 49° 43′, W. 13° 51′, barometer 29.15 (740.4) and falling steadily, wind s. by w., fresh gale; at 7 p. m., wind sse., with squalls of hurricane force, very high sea running, in which the vessel sustained damage to boats; at 11 p. m., the barometer began to rise and the weather improved. On the 5th, the disturbance was central as an extensive depression west of Ireland, causing heavy southerly and southwesterly gales and rain over the western part of that island.

III.—This is probably a continuation of the storm traced as low-area ii., of chart i., for February. On the 4th, the depression was central in the Canadian Maritime Provinces whence it moved into the Atlantic, causing moderate gales along the coast. The disturbance moved in an east-northeasterly direction, attended by rapidly diminishing pressure at the centre. On the 5th, the storm-centre was near N. 46°, W. 43°; the s. s. "State of Indiana," in N. 46° 24′, W. 44° 16′, reporting barometer 28.94 (735.1), wind ne., force 4, weather squally and changeable. Strong westerly and northwesterly gales occurred south and west of the centre, while to the eastward, the winds were of moderate force. The s. s. "Adriatic," in N. 45° 35′, W. 42° 56′, reported west wind of force 9, while the s. s. "Waesland," in N. 47° 12′, W. 42° 43′, had an easterly wind of force 4, with snow. By the 6th, the disturbance having moved rapidly northeastward was shown near N. 50°, W. 21°. Captain Scott, of the s. s. "Plantyn," reported as follows: "6th, 2 a. m. (ship's time), wind se., sea beginning to increase, barometer 28.60 (726.4), and falling rapidly; at 7 a. m. it was blowing a hard se. gale. with squalls of hurricance force and very high sea; at 9 a. m., the barometer read 27.90 (708.6), still falling; at 10.23 a. m., there was a calm for twenty minutes, and a water-spout was observed on the port-quarter; at this time, the barometer read 27.88 (708.4); at 11.5 a. m., 27.85 (707.4); at 11.25 a. m., 27.80 (706.1); during the last four hours the winds varied between s. and ssw. At noon, the ship's position was N. 50° 46′, W. 21° 52′, barometer 27.80 (706.1), strong gale; at 0.18 p. m., the wind veered to wsw. and w., blowing hard and increasing in force; 0.40 p. m., wind wnw.; 1 p. m., wind nw.; 1.10 p. m., barometer 27.69 (703.3), stationary, wind increasing in violence. At 1.40 p. m., the barometer read 27.74 (704.6); 4 p. m., 27.89 (708.4); 8 p. m., 28.20 (716.3); midnight, 28.50 (723.9); 4 a. m. of the 7th, 28.55 (725.2), wind of hurricane force. The gale was at its height between 5 and 8 p. m.; at 11 p. m., the wind began to decrease, and at midnight, it had moderated to a strong gale." (Note: the barometric values above given are as read off, the barometer is believed to read .46 inch too low.)

The following vessel-reports indicate that the values reported by the s. s. "Plantyn," are nearly correct, and leave no doubt as to the unusual depth of this depression:—

*S. S. "Silesia." between N. 40° 56′, W. 19° 10′, and N. 50° 53′, W. 23° 00′.

Date.	Time.	Barometer.		Wind.	Force.	Weather.
	(Greenwich.)	Inch.	Mill.			
February 6	5.10 a. m.	29.36	745.7	sse.	8	
6	9.10 a. m.	29.02	737.1	sse.	8	
6	11.10 a. m.	28.71	729.2	sse.	8	
6	12.10 p. m.	28.59	726.2	sse.	8	
6	1.10 p. m.	28.39	721.1	s.	8	
6	2.10 p. m.	28.31	719.1	s.	8	
6	3.10 p. m.	28.27	718.0	s	8	
6	4.10 p. m.	28.22	716.8	s.	8	
6	5.10 p. m.	28.26	717.8	s. by w.	8-9	
6	6.10 p. m.	28.39	721.1	s. by w.	8-9	
6	7.10 p. m.	28.52	724.4	s. by w.	8-9	
6	8.10 p. m.	28.56	725.4	s. by w.	8-9	
6	9.10 p. m.	28.66	728.0	w. by s.	8 9	
6	10.10 p. m.	28.81	731.8	w. by s.	8-9	
6	11.10 p. m.	29.04	737.6	w. by s.	8-9	
7	12.10 a. m.	28.92	734.8	w. by s.	8-9	
7	1.10 a. m.	28.92	734.8	w. by s.	10	
7	2.10 a. m.	28.96	735.6	w. by s.	10	
7	3.10 a. m.	29.09	738.9	w. by s.	10	
7	4.10 a. m.	29.09	738.9	w. by s.	10	
7	5.10 a. m.	29.11	739.4	w.	8	
7	6.10 a. m.	29.11	739.4	w.	8	
7	7.10 a. m.	29.11	739.4	w.	8	
7	8.10 a. m.	29.11	739.4	w.	8	
7	9.10 a. m.	29.11	739.4	w. by n.	6	
7	10.10 a. m.	29.08	738.6	w. by n.	6	
7	11.10 a. m.	29.08	738.6	w. by n.	6	

Captain McKay, of the s. s. "Pavonia," reported: 6th, at noon, Greenwich time, wind se. by s., force 5, barometer 28.14 (714.7), and falling; heavy confused and cross-sea; at 2 p. m. the barometer read 28.05 (712.5), stationary; wind hauling gradually to the westward, force 4, with heavy dark leaden clouds coming rapidly up from the westward. At 4.30 p. m., wind w., force 11, and continued to blow with hurricane force for four hours; sky completely covered with dark heavy clouds; after 4 p. m. the barometer began to rise, and at 10 p. m. the sky cleared and the wind gradually decreased. The ship's position at 4.30 p. m. was N. 51° 25′, W. 23° 02′. The s. s. "Bulgarian," in N. 51°, W. 22°, reported lowest barometer, 28.03 (711.9), at 4 p. m. of the 6th, wind varying from s. to w., with hurricane-like squalls and heavy rain. The s. s. "Abyssinia," in about N. 50°, W. 20°, reported: 6th, noon, hard s. gale with tremendous sea from the sw., barometer falling rapidly; at 6 p. m., the wind veered to w. and increased to hurricane force, barometer 28.27 (718.0); the vessel lay over on her side and would scarcely answer her helm, and blinding masses of spray completely covered her.

During the 6th, the storm-centre moved very slowly northeastward, and on the 7th, it was apparently near N. 52°, W. 17°, the pressure at the centre remaining nearly the same as on the preceding day. On the 7th, the s. s. "Péreire," in N. 51° 02′, W. 19° 49′, reported barometer 28.92 (734.6), wind nnw., force 3. Captain Berry of the above steamer reports: From the 6th to 7th, encountered a very violent hurricane with terrific sea, lowest barometric reading (aneroid) 28.15 (715.0); the wind changed from e. to w., by south, and was most violent when at ssw., and increased to force 10. On the same day, the s. s. "Pennsylvania," in N. 51° 10′, W. 16° 17′, reported barometer 29.03 (737.3), wind sse., force 9, heavy sea, cloudy. Vessels to the west of the centre reported moderate nw. winds, while to the eastward, southerly gales of hurricane force were experienced. On the 8th, the disturbance having moved northeastward, was central off the northwestern coast of Ireland, causing strong southerly gales along that coast and in the Hebrides.

IV.—This was a continuation of the depression charted as low-area iv., chart i. of this REVIEW. On the 7th, the disturbance was central over the Gulf of Saint Lawrence; it moved eastward over the southern part of Newfoundland, causing moderate gales in the southern quadrants. On the 8th, the depression was shown near N. 51°, W. 42°, the winds having increased to strong gales in the southwest quadrant. An extensive area of low barometric readings occupied the Atlantic north of the fiftieth parallel on the 8th; the pressure recovering but

slowly after the passage of the preceding depression, number iii., but the circulation of the winds, as reported by vessels west of the thirtieth meridian, indicated the existence of an independent storm-centre to the westward of that meridian. The s. s. "Scandinavian" reported: "8th, 3 a. m., Greenwich mean time, wind s. by e., force 7; barometer falling, wind shifting to westerly; 2.45 p. m., barometer 28.69 (728.7), gale increasing, with violent squalls; at 5.30 p. m., vessel shipped a heavy sea, damaging boats and washing a seaman overboard." The s. s. "Pavonia," in N. 49° 35′, W. 31 43′, reported barometer 29.18 (741.2), and falling, wind ssw., and gradually hauling to westerly; at 3.05 p. m., Greenwich mean time, wind sw., force 9 to 10, barometer 28.67 (728.2); at 4 p. m., wind w., force 10, barometer rising; 6 p. m., heavy squalls, attended by snow and very heavy sea. On the 9th, the storm-centre, moving northeastward, was probably near N. 55°, W. 25°; the s. s. "State of Nebraska" reported hard sse. gale until 6 p. m. of the 8th, when it lulled and hauled to sw., with threatening weather and falling barometer; and on the 9th, in N. 54° 25′, W. 24° 30′, the barometer read 28.24 (717.3), wind wsw., force 10, very high confused sea and snow squalls. Captain Vogelgesang, of the s. s. "Silesia," furnishes the following observations relative to this depression:

Gale of February 8–9th.—Ship's position N. 50° 04′, W. 29° 30′, to N. 49° 41′, W. 32° 22′.

Date.	Time.	Barometer.		Wind.	Force.	Weather.
	Greenwich.	*Inch.*	*Mill.*			
February 8	3.00 p. m.	29.21	741.7	ssw.	8	rainy.
8	4.00 p. m.	29.06	738.1	s.	8–9	do.
8	5.00 p. m.	28.89	736.1	s.	9	do.
8	5.30 p. m.	28.79	731.3	s.	9	do.
8	6.00 p. m.	28.81	731.5	s.	9–10	do.
8	7.00 p. m.	28.72	729.5	w. by s.	9–10	squally.
8	8.00 p. m.	28.74	730.0	w. by s.	10	do.
8	9.00 p. m.	28.79	731.3	w. by s.	10	lightning.
8	10.00 p. m.	28.79	731.3	w. by s.	10–11	do.
8	11.00 p. m.	28.79	731.3	w. by s.	10–11	squally.
8	midnight.	28.89	733.8	w. by s.	10–11	do.
9	1.00 a. m.	28.90	734.0	w. by s.	10–11	do.
9	2.00 a. m.	28.93	734.8	w. by s.	10	do.
9	3.00 a. m.	28.98	736.1	w. by s.	9–10	do.
9	4.00 a. m.	28.98	736.1	w.	9	do.
9	5.00 a. m.	28.98	736.1	w. by n.	9	do.
9	6.00 a. m.	29.00	736.6	w. by n.	9	do.
9	7.00 a. m.	29.02	737.1	w. by n.	9	do.
9	8.00 a. m.	29.08	738.6	wnw.	9	do.
9	9.00 a. m.	29.08	738.6	wnw.	8	do.
9	10.00 a. m.	29.14	740.1	wnw.	8	do.
9	11.00 a. m.	29.16	740.7	wnw.	7	do.
9	noon.	29.18	741.2	w.	7–8	do.
9	1.00 p. m.	29.20	741.7	w.	7	do.

On the 10th, the depression was apparently central near the Hebrides, causing a decrease of pressure over the British Isles and Scandinavia.

V.—This disturbance probably developed over the Gulf of Saint Lawrence, and, moving eastward, was central near the Banks of Newfoundland on the 10th. On the following day, the storm-centre was shown near N. 50°, W. 32°; the s. s. "Plantyn" reported as follows: 10th, noon (ship's time), latitude N. 50° 08′, longitude W. 30° 46′, strong west gale, with fierce squalls: barometer 28.91 (734.3); 10.30 p. m., calm and cloudy, rapidly falling barometer. 11th, 6 a. m., barometer 28.40 (721.3), wind sw.; at 6.20 a. m., wind suddenly shifted to nw., blowing with hurricane force; 7.30 a. m., barometer 28.60 (726.4); noon, 28.85 (732.8); ship's position at noon on the 11th, was N. 49° 40′, W. 33° 24′; during the gale the vessel sustained damages to boats and decks. Captain Berry, of the s. s. "Péreire," in about N. 49° 20′, W. 32° 50′, reported at 5. a. m., wind s., shifting to wsw., and freshening; at 9 a. m. the wind shifted to nw., blowing a hurricane; towards evening the wind moderated. The s. s. "Scandinavian," between N. 50° 37′, W. 31° 49′, and N. 51° 43′, W. 27° 25′, reported: 4.20 a. m., Greenwich time, gale moderating, barometer falling; from 5 a. m. to 7 p. m., wind from e. to nw., very variable in direction and force; at 8 p. m., blowing a hurricane from nw., barometer 28.20 (716.3). On the 12th, the storm-centre was near N. 54°, W. 22°, and heavy westerly gales were reported by all vessels between N. 47° and 52° and W. 40° and 20°. On the 13th, the disturbance moved northeastward, and was central west of the Hebrides, having caused strong southerly gales and rain over the British Isles.

VI.—This disturbance was probably a continuation of that traced as low-area v., of chart i., and during its progress eastward it appears to have developed great energy, the reports of marine disasters that occurred in mid-ocean indicating that this storm was one of the most dangerous of the month. The depression passed from the Canadian Maritime Provinces to the Atlantic early on the 12th, the lowest observed reading being 29.53 (750.0), at Halifax, Nova Scotia. By the morning of the 13th, the region of least pressure was transferred to about N. 49°, W. 35°, while a brisk increase of pressure set in over the region west of the forty-fifth meridian. Captain Scott, of the s. s. "Plantyn," reported: 13th, 4 a. m., (ship's time,) barometer 28.27 (718.0); 8 a. m., barometer 27.80 (706.1); 9.15 a. m., barometer 27.61 (701.3); 10 a. m., barometer 27.70 (703.6); 11 a. m., barometer 27.90 (708.6); noon, barometer 28.16 (715.3); during the twelve hours, the wind veered from ssw. to sw., w., wnw., nw., ne., nne., and n. The storm struck the ship at 9.45 a. m., and gave no sign of its approach. A little blue appeared in the northwest out of the hard gray sky, and the wind at once went to the ne. and backed again to the nne. and nw., with terrific squalls and high confused sea. Ship's position at noon, N. 48° 27′, W. 36° 22′. The s. s. "Abyssinia," between N. 48° 14′, W. 37° 00′, and N. 46° 33′, W. 41° 00′, reported, 13th, 6 a. m., the barometer had fallen to 28.25 (717.5), wind wnw., blowing a whole gale, and a heavy bank of clouds was observed to rise in the northwest; at 6.10 a. m., the wind veered to nw., and shortly afterwards a terrific squall burst on the steamer with hurricane force; the roar of the wind resembled the sound of thunder, and the clouds appeared to touch the water, which was carried along in driving masses of foam. At 8 a. m., the barometer read 28.80 (731.5), and the wind slowly but gradually moderated to a strong gale. Captain Ringk, of the s. s. "Donau," reported: On the afternoon of February 12th, (about N. 48°, W. 32°), had strong w. by s. breeze, weather squally, with hail; at 10.30 p. m., lat. N. 47° 48′, long. W. 33° 08′, barometer 29.45 (748.0). During the night, the wind gradually hauled to the southward, and at 2.20 a. m. of the 13th, in N. 47° 10′, W. 34° 15′, it was se., moderate breeze, barometer reading 29.12 (739.6); at 6.20 a. m., (N. 47° 19′, W. 35° 26′,) wind s. by w., fresh gale, weather overcast, with rain, barometer 28.63 (727.2); at 10.20 a. m., (N. 47° 10′, W. 36° 07′,) barometer 28.28 (718.3), wind sw. by w., stormy, with rain, upper part of atmosphere apparently clear; at 11.40 a. m., (N. 47° 10′, W. 36° 10′,) barometer 28.17 (715.5); at 1.10 p. m., (N. 47° 10′, W. 36° 13′,) barometer 27.93 (709.4). For half an hour, (at 0.40 p. m.,) fine clear weather, light clouds near the horizon; at 1 p. m., a thick bank coming up from the northwestward; at 1.10 p. m., wind suddenly shifted to w. by n., blowing with hurricane force. During the afternoon, the wind continued to blow with great violence from the nw., with very high confused sea, barometer rising rapidly; at 10.40 p. m., in N. 46° 50′, W. 36° 18′, the reading was 29.38 (746.2), weather stormy, with hail squalls. (N. B. The barometric readings are corrected.) Captain Healy, of the s. s. "England," in N. 49° 30′, W. 33° 00′, reported: encountered a hurricane, beginning at w. and veering to nnw.; at 6 a. m., Greenwich mean time, the barometer read 28.40 (721.3; at 10 a. m., 27.70 (703.6); at noon, 27.38? (695.4?); at 2 p. m., 28.18 (715.8); at 4 p. m., 28.76 (730.5); at midnight, 29.00 (736.0). The gale was at its height from noon to 6 p. m., when it began to moderate, leaving a high confused sea; at midnight, it was blowing a heavy nw. gale, which continued until the 16th.

Captain Gleadell, of the s. s. "Celtic," reported, in N. 48° 51′, W. 32° 12′, morning of the 13th, wind sw., fresh gale with heavy squalls and rain, barometer (aneroid) at 4 a. m., (ship's time) 29.03 (737.3); 8 a. m., 28.32 (719.3); noon, 28.01 (711.4), wind hauling to w., and moderating down to a moderate gale; at 2 p. m., wind nw., heavy and increasing gale, with violent

squalls; 2.30 p. m., barometer 27.88 (708.1), which was its lowest reading during the storm. The gale was at hurricane force, with terrific squalls and heavy rain, sea running high and dangerous until 8 p. m., when it slightly moderated, barometer 28.98 (736.1) and rising rapidly. Captain Cochrane, of the s. s. "The Queen," reported: 2 a. m. of the 13th, wind fell light and backed by west to south and southeast, beginning to freshen to strong breeze with rain, barometer falling rapidly; at 2 p. m., wind shifted to sw., in a fresh gale and high sea, barometer still falling; at 6 p. m., the aneroid barometer read 27.60? (701.0) and the mercurial barometer 28.90? (734.0); the wind came from wnw., and blew a hurricane for four hours, (ship's position, N. 48° 28′, W. 29° 04′), with heavy rain; it then settled down to a strong gale, with violent hail squalls, barometers all rising. The s. s. "Bohemia," in N. 46° 49′, W. 31° 43′, reported barometer (aneroid) 27.75 (704.8). Captain Morrison, of the s. s. "Ohio," reported: 13th, 4 a. m., in N. 49° 44′, W. 28° 48′, wind sse., moderate gale, light rain, barometer 29.19 (751.4); at 10 a. m., wind changed suddenly to wsw., squally and gusty, with rain, hail, and snow, barometer 28.47 (723.1); from 10 a. m. to 4 p. m., strong gusty winds, with hard squalls of rain and snow, wind generally from wsw. to wnw.; at 4 p. m., lowest barometer (corrected) 27.97 (710.4); at 4.30 p. m., wind shifted to nnw. and blew a hurricane for five hours, after which it settled down to a heavy gale with frequent squalls of snow, hail, and rain.

The reports show that this storm covered a very extensive area, all vessels between N. 45° and 50°, and W. 30° and 42°, encountered hurricane-like winds from west, northwest, and west-southwest, and vessels to the eastward of the thirtieth meridian, had heavy southerly gales. The report of the s. s. "St. Laurent," would indicate that the storm extended far southward and was equally severe. The report of the "St. Laurent," states that a violent hurricane was experienced on the night of February 13th, in the vicinity of the Azores (latitude and longitude not given); the captain was washed overboard; several seamen injured, and the vessel sustained much damage. On the 14th, the region of least pressure was transferred to about N. 54°, W. 23°; west of the thirtieth meridian, a general increase of pressure had set in, the winds becoming westerly and northwesterly, but showing no material decrease in force; to the eastward of W. 20°, the winds changed to southwesterly and increased in force. On the 15th, the depression passed northeastward, with increased pressure, at some distance from the Irish coast, causing strong ssw. gales and rain in Ireland.

VII.—After the passage of depression vi., the atmospheric pressure began to recover on the 14th, but this recovery was again checked by the development of a disturbance near N. 51°, W. 40°, on the 15th. The winds changed to ssw. and sw., near that region and rain or snow prevailed. On the 16th, the disturbance was central near N. 52°, W. 29°; the wind decreased somewhat in force in the western quadrants of the depression, and the weather became more settled. On the 17th, the disturbance apparently disappeared south of Iceland.

VIII.—This was probably a continuation of the disturbance charted as low-area vii., of chart i. On the 17th, it was central in Canada, whence it moved eastward over the ocean, and on the 18th, it was apparently central south of Newfoundland, attended by moderate gales. Moving northeastward, with increasing pressure, the disturbance on the 19th, was near N. 53°, W. 34°, attended by moderate northerly winds to the west of the centre, and moderate to strong ssw. to sw. gales, in the eastern quadrants. On the 20th, the winds decreased and the disturbance apparently dissipated, being followed by a great increase of pressure over the region east of the thirtieth meridian.

IX.—This is a continuation of low-area viii., of chart i. On the 21st, the disturbance passed over the Canadian Maritime Provinces, and on the 22d, was central southeast of Newfoundland, the pressure having decreased when the disturbance reached the ocean. Strong southerly gales occurred over the region east of the centre, and continued, with diminishing force, during the 23d and 24th. On the 25th, the winds changed to northwesterly, and the centre of disturbance was shown near N. 51°, W. 33°, the pressure gradually increasing, and on the following day the depression disappeared. The easterly movement of this disturbance was slow, being checked by an area of high barometer, 30.50 (774.7), which was spreading from western Europe over the ocean.

X.—This is a continuation of the storm traced as low-area ix., of chart i. On the 25th, the disturbance passed over Canada toward the Atlantic, and, on the 26th, it was central to the southward of Nova Scotia, causing moderate southerly gales in the eastern quadrants. During the 27th and 28th, the storm moved northeastward, and on the last-mentioned date it was central near N. 47°, W. 40°, attended by moderate southerly gales, the pressures near the the centre ranging from 29.60 (751.8) to 29.67 (753.6).

OCEAN ICE.

Chart ii. also shows the southern and eastern limits of icebergs in the north Atlantic during the month of February, and up to March 7, 1883. This chart is based on reports communicated by ship-masters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

Patches of floating ice and occasional icebergs have been observed as far south as the forty-second parallel, and to the westward of the fifty-second meridian, and isolated bergs have been reported as far eastward as W. 43°; but the reports show that the most dangerous region is that extending from about N. 43° 30′, W. 50° 30′, northeastward to N. 48° 00′, W. 45° 00′. Within this region, large numbers of icebergs were reported, together with numerous large ice-fields, rendering navigation extremely dangerous. An examination of the chart will strongly suggest the advisability of a southern route as offering a greater degree of safety for vessels bound to and from Europe.

Icebergs and ice-fields have been reported as follows:—

January 30th.—S. S. "Switzerland," in N. 47° 35′, W. 45° 04′, sighted a large iceberg, distant about six miles, with several smaller pieces near it.

February 10th.—S. S. "George Shatuck," sixty miles from Saint Pierre, Newfoundland, encountered vast fields of ice until she reached Whitehead.

February 11th.—S. S. "Limosa," in N. 47°, W. 47°, encountered a large field of ice, apparently the southeastern point of a large floe, the northern limit of which could not be seen from the masthead. The vessel was compelled to alter her course.

14th.—S. S. "Lake Winnepeg," in N. 44° 30′, W. 48° 30′, passed several icebergs and some field-ice.

16th.—S. S. "Bulgarian," in N. 46° 00′, W. 47° 00′, sighted field-ice; also some icebergs, one of which was about eighty feet high; ice-fields continued up to N. 45° 00′., W. 51° 00′.

18th.—S. S. "Amsterdam," in N. 45° 50′, W. 47° 30′, passed a large iceberg; in N. 45° 28′, W. 49° 08′, passed several large icebergs and sighted a large ice-field to the westward. Ship steamed a southerly course for sixty miles, then changed to westerly; after which no more ice was seen.

19th.—S. S. "The Queen," in N. 45° 49′, W. 47° 23′, came up to some field-ice and had to run to the southwestward for seven hours to clear it; several icebergs were also seen. The s. s. "Wyoming," in N. 45° 05′, W. 48° 45′, at 9 p. m., passed large quantities of field ice; also two small icebergs.

19th.—S. S. "Violet," forty miles east of Louisburg, Cape Breton island, encountered heavy drift-ice. The vessel drifted about the ice-field for eleven days, during which time a large hole, about six feet long, was knocked in her starboard bow. The vessel arrived at Halifax on March 4th, with forward compartment full of water.

20th.—S. S. "North Durham," in N. 45°, W. 47°, encountered a large field of ice which extended north and south as far

as the eye could reach; the ice-field extended from east to west one and one-half miles; also passed an iceberg. The s. s. "Rhynland," in N. 46° 19′, W. 45° 44′, passed a large iceberg, about two hundred feet high; in N. 46° 04′, W. 46° 26′, passed a group of nine icebergs, three of which were very large, one apparently leaving a reef extending northward about half a mile, over which the sea broke furiously; from N. 45° 55′, W. 46° 42′, to N. 45° 13′, W. 48° 49′, passed through large quantities of field-ice; new ice forming all over the Banks. In N. 45 33′, W. 43° 26′, passed a large iceberg; in N. 45° 21′, W. 43° 53′, passed a large iceberg; in N. 45° 13′, W. 48° 49′, cleared the field-ice.

21st.—S. S. "Werra," in N. 44° 43′, W. 48° 40′, passed an iceberg about eighty feet long and twenty feet high; s. s. "Republic," in N. 43° 46′, W. 49° 20′, passed an iceberg; s. s. "Waldensian," in N. 43° 31′, W. 50° 38′, fell in with large patches of field-ice; ice was also seen in N. 44° 25′, W. 48° 51′. The s. s. "Newfoundland," at Halifax, Nova Scotia, from Saint John's, Newfoundland, reported having passed a field of ice, extending from Saint John's to Whitehead, being visible as far as the eye could see.

22d.—S. S. "Helvetia," in N. 44° 05′, W. 48° 53′, passed through large quantities of field-ice, also sighted two icebergs; the s. s. "Alaska," in N. 44° 05′, W. 48° 53′, passed an iceberg and much drift-ice; the s. s. "State of Florida," between N. 48° 40′, W. 48° 40′, and N. 44° 00′, W. 49° 10′, passed large fields of ice and several icebergs, one of which was from eighty to one hundred feet high.

23d.—S. S. "Bavarian," in N. 45° 25′, W. 47° 52′, steamed through one hundred and twenty miles of field ice and sighted four large icebergs; the s. s. "Furnessia," in N. 45° 58′, W. 46° 18′, passed an iceberg about four miles to the northward; the s. s. "Hermann," from N. 45° 30′, W. 47° 00′, to N. 44° 20′, W. 49°, 00′, passed large fields of ice and six large icebergs; the s. s. "Weser," in N. 43° 40′, W. 48° 12′, passed an ice-field, also, in N. 43° 34′, W. 39° 03′, passed two icebergs.

24th.—S. S. "Bothnia," in N. 44° 12′, W. 48° 21′, sighted two large icebergs to the northward, one about ten miles off; also in N. 44° 05′, W. 48° 36′, passed several small icebergs and patches of ice; the s. s. "Denmark," in N. 46° 02′, W. 47° 08′, at 7.30 a. m., sighted large quantities of field-ice and numerous large icebergs; field-ice much broken up; got clear of ice in N. 44° 38′, W. 48° 17′, having steered southward for sixteen hours to avoid it. The s. s. "Furnessia," in N. 44° 36′, W. 48° 37′, passed several small icebergs; the s. s. "Jason," in N. 48° 03′, W. 48° 56′, passed three large icebergs; the s. s. "Vandalia," in N. 44° 56′, W. 48° 22′, passed two icebergs, also in N. 44° 46′, W. 48° 37′, passed an ice-field.

25th.—S. S. "Jason," in N. 42° 01′, W. 52° 46′, passed an iceberg three hundred and fifty feet high; the s. s. "Pennland," in N. 45° 00′, W. 47° 30′, passed through a large quantity of field-ice; s. s. "Vandalia." in N. 43° 24′, W. 50° 55′, passed an iceberg.

26th.—S. S. "Bothal," in N. 46° 00′, W. 47° 29′, passed a large iceberg; the s. s. "Erl King," in N. 45° 00′, W. 47° 30′, at 7.30 a. m., passed a large iceberg; steered wsw. fifty miles and passed twenty-six icebergs; at noon, in N. 44° 40′, W. 48° 35′, encountered quantities of field ice closely packed, but easily broken; steamed through it for thirty miles, then found clear water.

27th.—Captain H. Schoonhoven, of the s. s. "Daniel Steinmann," reported as follows: "27th, at 12.09 p. m., Greenwich mean time, in N. 45° 33′, W. 47° 10′, saw the first iceberg bearing nw. by compass, distant one mile, my true course being wsw.; about one hour later, saw an iceberg right ahead, and then several others on both sides, some being of immense size; kept ship away sw. (true) to clear them. At 4 p. m., still steering sw., steamed along a large ice-field, bearing about nw. by compass, distant two miles; it was from fifteen to twenty miles in extent, and there could be seen amongst it several large icebergs; later, passed several icebergs. The weather had now become misty, and at 1 a. m. of the 28th, fell in with a large ice-field; kept away s. by w., (true), but at 1.30 a. m., was completely surrounded by ice; the sea being smooth, steamed slowly through it, keeping a ssw. course. At 3.30 a. m., got clear of ice, weather having cleared up. I again steered my wsw. course at full speed, being then in N. 44° 29′, W. 49° 04′, and saw no icebergs nor field-ice afterwards. We could distinguish the icebergs in the dark at a distance of one-quarter to one-half mile."

27th.—S. S. "Schiedam," in N. 44°, W. 47°, passed three icebergs and some small pieces; the s. s. "Spain," between N. 45° 03′, W. 48° 26′, and N. 44° 05′, W. 49° 06′, passed thirteen icebergs and large quantities of field-ice. The s. s. "Wieland," between N. 45°, W. 48° and N. 44°, W. 50°, saw twenty-five icebergs, and from 3.45 p. m. to 6 p. m., steamed a southerly course along the edge of an ice-field.

28th.—S. S. "British Crown," in N. 44°, W. 47°, passed three icebergs; s. s. "Lake Manitoba," in N. 45°, W. 48°, passed south of a vast ice-field and numerous icebergs, extending north and south as far as the eye could reach; the s. s. "Sorrento," in N. 45° 00′, W. 48° 08′, passed through thirty-seven miles of field-ice; the s. s. "State of Alabama," in N. 42° 30′, W. 50° 00′, passed a quantity of drift-ice; the s. s. "Newcastle City," in N. 45° 20′, W. 48° 00′, passed several icebergs and heavy drift-ice.

March 2d.—S. S. "Eastbourne," in N. 47°, W. 47°, passed several large icebergs.

3d.—S. S. "Greece," from N. 43° 29′, W, 48° 01′, to N. 42° 27′, W. 49° 31′, passed fourteen icebergs and a quantity of broken ice; the s. s. "Hohenstauffen," in N. 45° 43′, W. 48° 00′, passed several icebergs and some large ice-fields.

4th.—S. S. "Parthia," between N. 43° 50′, W. 48° 33′ and N. 43° 18′, W. 49° 45′, passed several icebergs; the s. s. "Wisconsin, in N. 43° 14′, W. 49° 04′, at 9.15 p. m., passed a large iceberg; the s. s. "Devon," N. 47° 44′, W. 43° 44′, reported: from the 4th to 6th, passed twelve large icebergs, and passed through about fifty miles of field ice; the s. s. "Newcastle City," forty miles south of Sambro, Nova Scotia, got into a field of ice and was detained in it for eight hours; the s. s. "State of Nebraska," in N. 43° 00′, W. 49° 30′, passed several icebergs and some field ice.

5th.—The s. s. "Australia," in N. 45° 00′, W. 47° 10′, passed several icebergs; the s. s. "Oder," between N. 47° 07′, W. 46° 58′, and N. 43° 18′, W. 50° 04′, passed immense fields of ice and many icebergs; the s. s. "Pieter de Coninck," in N. 42° 50′, W. 49° 30′, passed large iceberg.

7th.—S. S. "Peruvian," in N. 42° 33′, W. 51° 00′, passed a large iceberg.

The s. s. "Arctic," at Saint John's, Newfoundland, March 11th, from Dundee, February 27th, reported having passed through two hundred and fifty miles of field ice on the Atlantic. When three hundred miles east of Saint John's, seventy-eight enormous icebergs were seen from the steamer's bridge.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada, for the month of February, 1883, is exhibited on chart iii., by the dotted isothermal lines.

In the districts south of the Ohio river and east of the Mississippi, the mean temperature for the month has been above the normal, the departures being greatest in the south Atlantic and east Gulf states. In all other districts the temperature has been below the normal. In New England, and over the southern part of the country from the Rio Grande valley to Pacific coast, the departures from the normal have been slight, but they have been very marked in the northern plateau and northern and middle slopes.

In the first column of the following table is shown the mean temperature of February in previous years for the several districts, as determined from observations made at the Signal-Service stations; the second column shows the mean of Feb-

ruary, 1883, and the third column shows the departures from the February normal:—

Average Temperatures for February, 1883.

Districts.	Average for February Signal Service observations.		Comparison of Feb., 1883, with the average for several years.
	For several years.	For 1883.	
	°	°	°
New England	26.6	28.0	0.6 below.
Middle Atlantic states	35.5	37.7	2.2 above.
South Atlantic states	49.5	53.8	4.3 above.
Florida peninsula	62.7	69.2	6.5 above.
Eastern Gulf	52.6	56.5	3.9 above.
Western Gulf	56.3	59.6	2.7 below.
Rio Grande valley	59.1	56.3	2.8 below.
Tennessee	44.2	45.8	1.6 above.
Ohio valley	39.7	39.8	0.1 above.
Lower lakes	26.4	24.3	2.1 below.
Upper lakes	22.8	17.8	5.0 below.
Extreme northwest	11.4	5.5	5.9 below.
Upper Mississippi valley	28.2	21.6	6.6 below.
Missouri valley	27.0	21.9	5.1 below.
Northern slope	25.9	17.1	8.8 below.
Middle slope	34.8	22.0	12.8 below.
Southern slope	48.4	43.0	5.4 below.
Northern plateau	31.6	15.0	16.6 below.
Middle plateau	32.5	26.7	5.8 below.
Southern plateau	45.4	44.5	0.9 below.
North Pacific	39.4	35.1	4.3 below.
Middle Pacific	50.6	46.3	4.3 below.
South Pacific	54.3	52.2	2.1 below.
Mount Washington, N. H.	6.5	2.3	4.2 below.
Pike's Peak, Colo.	3.3	4.4	1.1 above.

The following are some of the extreme monthly mean temperatures reported from Signal-Service stations:—

Stations reporting highest.		Stations reporting lowest.	
	°		°
Key West, Florida	75.0	Saint Vincent, Minnesota	— 1.7
Punta Rassa, Florida	70.7	Fort Washakie, Wyoming	1.0
Cedar Keys, Florida	66.9	Mt. Washington, New Hampshire	2.3
Jacksonville, Florida	64.3	Moorhead, Minnesota	2.9
New Orleans, Louisiana	62.9	Pike's Peak, Colorado	4.4
Port Eads, Louisiana	61 8	Eagle Rock, Idaho	5.1
Pensacola, Florida	60.9	Bismarck, Dakota	7.8
Savannah, Georgia	60.1	Fort Assinniboine, Montana	9.5
Laredo, Texas	59.6	Fort Keogh, Montana	10.8
Mobile, Alabama	59.6	Saint Paul, Minnesota	12.1
Brownsville, Texas	58.8	Escanaba, Michigan	12.4

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the above table of comparative temperatures.

The Chief Signal Officer is indebted to voluntary observers for the following notes upon this subject. These comparisons are of special importance, as many of the records from which they are made cover long periods of time, some extending back many years before the establishment of the Signal Service:—

Illinois.—Riley, the mean temperature of the past winter months is 14°.3, or 7°.1 below the average of the last twenty years. Anna, mean temperature, 35°.0, or 3°.66 below the February mean of the last eight years.

Indiana.—Logansport, mean temperature, 26°.2, is 4°.1 below the February mean of the last twenty-four years. The lowest February mean of that period, 17°.5, occurred in 1875. The maximum temperature of the month, 70°, is 6°.3 above the average; the minimum, —5°, is 8°.4 below the average.

Vevay, mean temperature, 39°.16, is 3°.26 above the February average. The maximum temperature, 75°, is 11°.37, above the average maxima; the minimum, 15°, is 9°.75 above the average minima.

Kansas.—Wellington, mean temperature, 31°.3, is 4°.4 below the February average of the last four years. During that period, the highest February mean, 40°.1, occurred in 1882. The minimum temperature of February, 1883, is —15°.5, or 10° below any former February minimum of four years record. Yates Centre, mean temperature, 27°.2, is 6° below the average of the last three years. The average temperature of the past winter is 4°.6 below the mean of the three preceding years. Lawrence, Professor F. H. Snow, of the State University, reports mean temperature, 27°.92, or 5°.64 below the February average of the last fifteen years. During that period the highest February mean, 41°.65, occurred in 1882; the lowest, 21°.02, occurred in 1875. The highest maximum temperature of the same period, 74°.5, occurred in 1876; the lowest, —12° (with the exception of —13°, 1883), occurred in 1872. The mean temperature of the month, at 7 a. m., was 21°.34; at 2 p. m., 34°.44; at 9 p. m., 27°.96. The past winter, although cold, has been less severe than the winters of 1872–3, 1874–5, and 1880–1.

Maine.—Gardiner, mean temperature, 18°.9, or 1°.62 below the February average of forty-seven years.

Maryland.—Fallston, mean temperature, 32°.79, is 0°.48 above the February average of the last twelve years. During that period the highest February mean, 37°.79, occurred in 1880; the lowest, 23°.67, occurred in 1875.

Missouri.—Saint Louis, the Missouri Weather Service reports the mean temperature to be 3°.5 below the normal as deduced from a record covering a period of more than forty years. Corning, mean temperature, 27°.92, or 5°.64 below the average of the last fifteen years.

New Hampshire.—Grafton, mean temperature, 16°.7 or 3°.5 below the average of February from 1878 to 1881, inclusive, and is lower than the mean of any February of that period. Contoocookville, mean temperature, 21°.8, is 0°.75 below the February average of the last twelve years.

New York.—North Volney, mean temperature, 22°.2, is 6° below the February average of last fifteen years. During that period the highest February mean, 28°.4, occurred in 1872; the lowest, 13°.2, occurred in 1875. Palermo, mean temperature, 19°.9, is 1°.9 below the February average of the last thirty years. During that period the highest February mean, 27°.6, occurred in 1877; the lowest, 12°.6, occurred in 1875.

Vermont.—Woodstock, mean temperature, 16°.8, is about the February normal of the last sixteen years. The highest February mean of that period, 23°.5, occurred in 1877; the lowest, 9°.67 occurred in 1875. The highest recorded temperatures of the same period, 59°, occurred in 1875; the lowest, —41°, occurred in 1874.

Virginia.—Variety Mills, mean temperature, 41°.4, is 1°.8 above the February average of the last six years. Wytheville, mean temperature, 41°.0, is 3°.82 above the February mean of a period of nineteen years.

West Virginia.—Helvetia, mean temperature, 38°.2, is 2°.12 above the February average of the last seven years.

RANGES OF TEMPERATURE AT SIGNAL-SERVICE STATIONS.

The monthly ranges of temperature over the entire country have varied from 17° at Key West, Florida, to 99° at Fort Benton, Montana. The largest monthly ranges have occurred in the northern and middle slopes and in the Missouri valley; the smallest, along the Atlantic and Gulf coasts and in California. The smallest monthly ranges are as follows: Key West, Florida, 17°; Cape Mendocino, California, 31°; Provincetown, Massachusetts, 31°; Fort Macon and Hatteras, North Carolina, 31°; Punta Rassa, Florida, 31°; Newport, Rhode Island, 32°; Portsmouth, North Carolina, 34°; Block Island, Rhode Island, 34°; San Francisco, California, 36°; Cape May, New Jersey, 36°; Smithville, North Carolina, 36°; Albany, New York, 37°; New London, Connecticut, 38°; Charleston, South Carolina, 39°; Williamsport, Pennsylvania, 40°; Delaware Breakwater, Delaware, 40°; Philadelphia, Pennsylvania, 40°; New Orleans, Louisiana, 40°. The largest monthly ranges are: Fort Benton, Montana, 99°; Fort Washakie, Wyoming, 95°; Fort Shaw, Montana, 95°; Deadwood, Dakota, 94°; Fort Keogh, Montana, 90°; Fort Bennett, Dakota, 89°; Fort Assinniboine, Montana, 88°; West Las Animas, Colorado, 86°; Fort Missoula, and Billings, Montana, 85°; Cheyenne, Wyoming, 83°; Helena, Montana, 82°; Omaha, Nebraska, 82°; Fort Buford, Dakota, 81°; North Platte, Nebraska, 81°; Fort Elliott, Texas, 80°; Huron, Dakota, 80°; Dayton, Washington Territory, 78°; Henrietta, Texas, 78°; Denver, Colorado, 78°; Leavenworth, Kansas, 78°; Jacksborough, Texas, 77°; Eagle Rock, Idaho, 76°; Duluth, Minnesota, 75°; Stockton, Texas, 74°; Fort Concho, Texas, 73; Moorhead and Saint Vincent,

Minnesota, 73°; Des Moines, Iowa, 73°; Mount Washington, New Hampshire, 72°; Umatilla, Oregon, 70°; Fort Sill, Indian Territory, 70°; Saint Paul, Minnesota, 70°; Fort Smith, Arkansas, 70°; Denison, Texas, 70°. The greatest daily ranges of temperature have varied in the different districts as follows:

New England.—From 16° at Provincetown, Massachusetts, on the 1st, 10th, and 22d, to 27° at Portland, Maine, on the 14th, and 43° on the summit of Mount Washington, New Hampshire, on the 4th.

Middle Atlantic states.—From 23° at Philadelphia and Williamsport, Pennsylvania, on the 3d and 24th, respectively; at Barnegat City, New Jersey, on the 4th, and at Albany, New York, on the 24th, to 35° at Cape Henry and Norfolk, Virginia, on the 4th.

South Atlantic states.—From 21° at Fort Macon, North Carolina, on the 18th, to 33° at Savannah and Augusta, Georgia, on the 18th and 28th, respectively, and at Wilmington, North Carolina, on the 3d.

Florida peninsula.—From 10° at Key West, on the 23d, to 20° at Punta Rassa, on the 28th.

Eastern Gulf.—From 25° at Pensacola, Florida, on the 21st, to 40° at Starkville, Mississippi, on the 17th.

Western Gulf.—From 21° at Port Eads, Louisiana, on the 17th, and 30° at Galveston, Texas, on the 3d, to 54° at Palestine, Texas, on the 3d.

Rio Grande valley.—From 42° at Brownsville, on the 4th, to 45° at Eagle Pass, on the 3d.

Ohio valley.—From 29° at Indianapolis, Indiana, on the 16th and 17th, to 40° at Pittsburg, Pennsylvania, on the 17th.

Table of Comparative Minimum Temperatures for the Month of February.

State or Territory.	Minimum for February, 1883, Signal Service.		Lowest since Signal-Service stations were opened—3 to 12 years.			Lowest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
		°		°			°		
Alabama	Montgomery	32	Montgomery	22	1875	Huntsville	— 6	'32? '36?	9 years
Arizona	Fort Apache	0	Prescott	—11	1880	Fort Canby (old)	—12	1855	12 "
Arkansas	Fort Smith	8	Little Rock	22	1881	Fort Smith	— 4	1840	22 "
Do						Fayetteville	4	1881	1 "
California	Visalia	17	Campo	16	1877	Fort Bidwell	—18	1868	19 "
Colorado	West Las Animas	—22	Pike's Peak	—37	1875	Fort Garland	—23		30 "
Do	Pike's Peak	—22	Denver	—20	1881	Fort Lewis	—30	1880	1 "
Connecticut	New Haven	8	New Haven	— 4	1881	Colebrook	—28	1861	14 "
Do			New London	— 3	1873	New Haven	—16	1835?	86 "
Dakota	Rapid City	—40	Pembina	—48	1876	Fort Abercrombie	—40	'61, '69	16 "
Do	Fort Buford	—40				Fort Pembina	—45	1875	7 "
Delaware	Delaware Breakwater	23	Delaware Breakwater	7	1881	Dover	— 3	1875	6 "
Do						Fort Delaware	0	1866?	45 "
Dist. of Columbia	Washington	21	Washington	— 1.5	1875	Washington	— 5		49 "
Florida	Pensacola	38	Saint Marks	28	1875	Fort Barrancas	11	1852?	58 "
Georgia	Atlanta	28	Atlanta	21	1881	Augusta Arsenal	— 2	1835	51 "
Do			Augusta	22	1875				
Idaho	Eagle Rock	—36	Eagle Rock	—29	1882	Fort Hall	—13	1880	15 "
Illinois	Chicago	— 9	Chicago	—13	1875	Winnebago	—20	1864?	11 "
Do						Belvidere	—31.5	1875	5 "
Indiana	Indianapolis	4	Indianapolis	— 8	1875	Spiceland	—21	1866	14 "
Indian Territory	Fort Sill	— 3.5	Fort Supply	— 8	1881	Fort Gibson	—12	1857?	49 "
Do			Fort Gibson	5	1875				
Iowa	Des Moines	—23	Dubuque	—31	1875	Guttenburg	—37	1868	11 "
Do			Davenport	—16	1875				
Kansas	Leavenworth	—13	Dodge City	—10	1881	Fort Leavenworth	—26	1834	50 "
Do			Leavenworth	— 9	'73, '75				
Kentucky	Louisville	17	Louisville	0	1875	Newport Barracks	—20		29 "
Louisiana	Shreveport	24	Shreveport	22	'75, '81	Fort Jesup	7	'23, '38	23 "
Do						Baton Rouge	10	1852?	57 "
Maine	Eastport	— 6	Eastport	—20	1875	Brunswick	—28	1859?	53 "
Do			Portland	— 7	'74, '76				
Maryland	Ocean City	19	Baltimore	2	1873	Fort McHenry	— 6	1875	50 "
Do						Deer Park	—10	1881	1 "
Massachusetts	Boston	11	Boston	— 6.5	1876	Williamstown	—26	1835?	61 "
Do			Springfield	— 6	1880	Lunenburg	—26	1855	24 "
Michigan	Escanaba	—24	Marquette	—27	1875	Fort Brady	—55	1875	59 "
Do			Escanaba	—32	1875	Ontonagon	—37	1861	11 "
Minnesota	Saint Vincent	—38	Saint Vincent	—35	1882	Fort Ripley	—43	1860?	18 "
Do			Breckenridge	—34	'75, '79				
Do			Duluth	—34	1875				
Mississippi	Starkville	24	Vicksburg	21	1875	Columbus	14	1864?	10 "
Missouri	Saint Louis	— 0.5	Saint Louis	— 3	1875	Saint Louis	—25	1835	44 "
Montana	Fort Assiniboine	—47	Fort Benton	—34	1873	Fort Ellis	—53	1872	13 "
Nebraska	North Platte	—29	North Platte	—23	1881	Fort MacPherson	—24	1874	13 "
Do			Dodge City	—16	1875	Camp Sheridan	—29	1881	5 "
Nevada	Ploche	— 1	Winnemucca	—17	1882	Fort Ruby	—19	1864?	6 "
New Hampshire	Mount Washington	—28	Mount Washington	—42	1870	Stratford	—37	1861	11 "
Do						Dartmouth College	—33	1848	18 "
New Jersey	Little Egg Harbor	12	Atlantic City	— 5	1875	Newark	— 7	1861	14 "
Do			Squan Beach	— 5	1875				
New Mexico	Santa Fé	6	Santa Fé	— 3	'79, '80	Fort Union	—21	1861	20 "
New York	Oswego	2	Albany	—18	1875	Sackett's Harbor	—46	1861	8 "
Do			Buffalo	—13	1875	Belleville	—34	1836?	15 "
North Carolina	Charlotte	30	Wilmington	15	1875	Fort Johnson	3		58 "
Do			Kittyhawk	11	1881				
Ohio	Sandusky	4	Toledo	—12	1875	Hillsborough	—22	1838	35 "
Do			Sandusky	—11	1875				
Oregon	Umatilla	—24	Umatilla	0	1881	Camp Harney	—16	1868	12 "
Do			Portland	24	1875				
Pennsylvania	Erie	6	Erie	—16	1875	Lewisburg	—23	'65, '67	6 "
Do			Pittsburg	—12	1875	Philadelphia	— 2	1866	113 "
Rhode Island	Narragansett Pier	11	Newport	— 2	1881	Providence	—16	1866?	35 "
South Carolina	Charleston	39	Charleston	26	1881	Charleston	22	1852?	105 "
Do						Fort Moultrie	6	1835	38 "
Tennessee	Memphis	31	Knoxville	6	1873	Glenwood Cottage	— 4	1864?	11 "
Texas	Fort Elliott	—10	Fort Elliott	— 1	1881	Fort McKavett	8	1873?	28 "
Do			Galveston	32	1881	Fort Elliott	4	1880	1 "
Utah	Salt Lake City	0	Salt Lake City	— 3	1874	Fort Crittenden	— 6		3 "
Do						Camp Douglass	0		19 "
Vermont	Burlington		Burlington	—18	1881	Randolph	—31	1868	5 "
Virginia	Cape Henry	25	Fort Myer	1	1881	Alexandria	3	1855	12 "
Do			Lynchburg	3	1875				
Washington	Dayton	—24	Spokane Falls	— 7	1881	Fort Colville	—20		15 "
West Virginia	Morgantown	12	Morgantown	—10	1875	Helvetia	— 6	1880	3 "
Wisconsin	La Crosse	—21	La Crosse	—34	1875	Fort Howard	—38	1823	31 "
Do			Milwaukee	—32	1875	Superior City	—38	1863	3 "
Wyoming	Fort Washakie	—34	Cheyenne	—24	1874	Fort Fetterman	—40	1873	12 "
Do						Fort Laramie	—35	1864?	28 "

Table of Maximum and Minimum Temperatures for February, 1883.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Montgomery	81	32	Green Springs	84	32
Do	Mobile	78	36	McPherson Barracks	83	31
Arizona	Yuma	82	31	Texas Hill	84	28
Do	Fort Apache	66	0			
Arkansas	Fort Smith	78	8	Mount Ida	70	8
California	San Diego	83	36	Borden	100	17
Do	Visalia	76	17	Berryvale	76	9
Colorado	West Las Animas	64	—22	Pagosa Springs	70	—30
Do	Pike's Peak	56	—22	Fort Lyon	66	—23
Connecticut	New Haven	53	8	Southington	63	— 3
Dakota	Rapid City	60	—40	Morriston	70	—30
Do	Fort Sully	60	—30	Fort Totten	35	—40
Do	Fort Buford	41	—40			
Delaware	Del. Breakwater	63	23			
District of Columbia	Washington	68	21	Kendall Green	60	20
Florida	Sanford	85	50	Saint Augustine	81	40
Do	Pensacola	78	38	Fort Barrancas	78	23
Georgia	Augusta	82	34	Forsyth	78	32
Do	Atlanta	74	28			
Idaho	Fort Lapwai	58	—25			
Do	Eagle Rock	40	—36			
Illinois	Cairo	74	12	Anna	73	8
Do	Chicago	57	— 9	Morrison	42	—22
Indiana	Indianapolis	72	4	Princetown	76	10
Do				South Bend	48	—10
Indian Territory	Fort Sill	74	— 3.5			
Do	Fort Supply	73	—11			
Iowa	Keokuk	62	— 7	Cedar Rapids	48	—33
Do	Des Moines	50	—23	Humboldt	38	—32
Kansas	Leavenworth	66	—12	Lawrence	68	—15
Do				Wellington	68	—15
Do				Topeka	65	—21
Kentucky	Louisville	78	17	Frankfort	78	17
Louisiana	New Orleans	80	40	Point Pleasant	85	28
Do	Shreveport	77	24			
Maine	Portland	54	7	Dexter	48	—14
Do	Eastport	43	— 6	Cornish	52	— 4
Maryland	Baltimore	64	22	Emmittsburg	68	11
Do	Ocean City	71	19	Woodstock	65	10
Massachusetts	Boston	60	11	Rowe	44	— 8
Do	Provincetown	44	13	Williamstown	45	— 6
Michigan	Detroit	58	6	Fort Brady	40	—37
Do	Escanaba	37	—24	Hillsdale	52	— 7
Minnesota	Saint Paul	46	—24	Minneapolis	41	—27
Do	Saint Vincent	35	—38			
Mississippi	Vicksburg	83	28			
Do	Starkville	81	24			
Missouri	Saint Louis	67	—0.5	Protem	76	9
Do				Corning	58	—23
Do				Oregon	62	—22
Montana	New Chicago	60	—45	Fort Maginnis	58	—40
Do	Fort Assiniboine	41	—47	Fort Ellis	56	—40
Nebraska	Omaha	57	—25	Fort Niobrara	65	—32
Do	North Platte	52	—29	Utica	66	—28
Nevada	Pioche	57	— 1	Golconda	80	—30
Do				Boca	56	—25
New Hampshire	Mt. Washington	43	—28	Grafton	48	—14
Do				New Market	59	— 7
New Jersey	Atlantic City	64	17	Vineland	66	18
Do	Little Egg Harbor	61	12	Moorestown	56	5
New Mexico	Santa Fé	62	6	Fort Union	62	— 7
Do	Silver City	62	12	Lordsburg	67	20
New York	Buffalo	64	7	West Point	57	5
Do	Oswego	51	2	Plattsburg Barracks	49	—11
North Carolina	Kittyhawk	76	32	Highlands	59	12
Do	Charlotte	76	30	Chapel Hill	77	25
Ohio	Cincinnati	73	16	Portsmouth	84	20
Do	Sandusky	70	4	Ruggles	70	2
Oregon	Roseburg	69	9	Albany	63	8
Do	Umatilla	46	—24			
Pennsylvania	Pittsburg	76	13	Dyberry	47	—10
Do	Erie	70	6	Meadville	68	4
Rhode Island	Narragansett Pier	52	11			
South Carolina	Charleston	78	39	Stateburg	78	34
Tennessee	Memphis	79	21	Austin	78	21
Do	Nashville	77	22	Murfreesborough	76	21
Texas	Laredo	91	25	Fort Concho	81	5
Do	Fort Elliott	70	—10			
Utah	Salt Lake City	50	0	Ogden	55	— 8
Do				Promontory	49	—14
Vermont				Woodstock	55	—22
Virginia	Cape Henry	78	25	Johnsontown	80	26
Do	Lynchburg	73	28	Marion	75	18
Washington	Almota	54	— 9	Fort Canby	66	14
Do	Dayton	54	—24			
West Virginia	Morgantown	75	12	Helvetia	72	16
Wisconsin	Milwaukee	50	—13	Neillsville	52	—26
Do	La Crosse	45	—21	Beloit	51	—18
Wyoming	Cheyenne	55	—28	Fort Bridger	43	— 1
Do	Fort Washakie	42	—54	Fort Washakie	45	—57

Tennessee.—From 30° at Chattanooga, on the 2d, to 35° at Memphis, on the 2d and 3d.

Lower lakes.—From 28° at Detroit, Michigan, on the 13th, to 42° at Buffalo, New York, on the 17th.

Upper lakes.—From 29° at Grand Haven, Michigan, on the 12th, and at Milwaukee, Wisconsin, on the 29th, to 44° at Alpena, Michigan, on the 17th.

Extreme northwest.—From 38° at Bismarck, Dakota, on the 19th, to 43° at Moorhead, Minnesota, on the 12th.

Upper Mississippi valley.—From 29° at Dubuque, Iowa, on the 16th, to 48° at Davenport, Iowa, on the 16th.

Missouri valley.—From 32° at Yankton, Dakota, on the 12th, to 48° at Leavenworth, Kansas, on the 16th.

Northern slope.—From 34° at Billings, Montana, on the 10th, to 53° at Fort Washakie, Wyoming, on the 10th.

Middle slope.—From 26° on the summit of Pike's Peak, Colorado, on the 24th, and 37° at Fort Elliott, Texas, on the 25th, to 56° at West Las Animas, Colorado, on the 18th.

Southern slope.—From 38° at Fort Davis, Texas, on the 1st, to 54° at Fort Stockton, Texas, on the 6th.

Southern plateau.—From 33° at Santa Fé, New Mexico, on the 18th and 19th, to 55° at Fort Apache, Arizona, on the 5th.

Middle plateau.—From 27° at Salt Lake City, Utah, on the 1st, to 30° at Pioche, Nevada, on the 9th.

Northern plateau.—From 23° at Umatilla, Oregon, on the 2d and 7th, to 43° at Eagle Rock, Idaho, on the 8th.

North Pacific.—From 24° at Portland, Oregon, on the 25th, to 34° at Roseburg, Oregon, on the 26th.

Middle Pacific.—From 19° at San Francisco, California, on the 27th, to 36° at Red Bluff, California, on the 19th.

South Pacific.—From 33° at Visalia and Los Angeles, California, on the 12th and 18th, respectively, to 34° at San Diego, California, on the 19th.

LOW TEMPERATURES.

Topeka, Kansas, 2d.—A severe blizzard is now prevailing over nearly the entire state. The continued cold weather has frozen some of the smaller streams to the bottom. The winter is proving the most severe for years.

New Orleans, Louisiana, 4th.—Reports from points in Texas state that extremely cold weather prevails throughout the state. At Dallas, the temperature fell to 3° below zero, and rose to 7° above zero at noon, but fell to zero at night. The country is covered with snow and ice; all trains are out of time, and business is nearly suspended.

Fort Reno, Indian Territory.—A severe norther set in at about 9 a. m. of the 2d, and continued until the 6th, during which very cold weather prevailed. Two companies of the Ninth Cavalry from Fort Sill, Indian Territory, en route via this point to Okalahoma, had a large number of men badly frost-bitten. The storm is said to have been the most severe experienced in this territory.

Umatilla, Oregon, 4th.—The minimum temperature of this date, —24°, is the lowest that has been recorded since the establishment of the signal office at this place, in 1877.

San Antonio, Texas, 5th.—Stockmen report the loss of large numbers of sheep from freezing. The temperature fell to 17° at this place, and at many points in the northern part of the state it fell to zero. The weather is the coldest experienced in Texas for many years, causing much suffering among the lower classes of the inhabitants.

Fort McKavett, Texas, 8th.—It is estimated that from two to three per cent. of the live-stock in this section has been killed by the recent cold weather.

Princeton, California, 8th.—Coldest weather experienced here for eleven years; minimum temperature this date, 20°.

Corning, Missouri, 16th.—The minimum temperature of this date, —16°, is the lowest recorded here during the last sixteen years.

Denver, Colorado, 9th.—The cattle men of this state estimate the loss of cattle, from the recent cold, to be about five per cent., and the loss of sheep somewhat greater.

FROSTS.

In the various districts they were reported on the following dates:—

New England.—1st to 28th.

Middle Atlantic states.—1st, 2d, 5th, 6th, 8th, 9th, 10th, 13th, 14th, 18th to 24th, 27th.

South Atlantic states.—1st, 2d, 19th to 23d, 25th to 28th.

Eastern Gulf.—1st, 20th, 27th, 28th.
Western Gulf.—1st, 3d to 6th, 12th, 17th to 21st, 25th to 28th.
Rio Grande valley.—4th, 5th, 7th, 17th, 18th.
Tennessee.—1st, 2d, 4th to 10th, 17th to 21st, 25th to 28th.
Ohio valley.—1st, 2d, 4th to 10th, 12th, 13th, 17th to 21st, 23d, 26th, 27th.
Lower lakes.—1st, 5th, 6th, 8th, 10th, 12th, 13th, 23d.
Upper lakes.—1st to 28th.
Extreme northwest.—1st to 28th.
Upper Mississippi valley.—1st to 28th.
Missouri valley.—1st to 28th.
Northern slope.—1st to 28th.
Middle slope.—1st to 7th, 9th, 10th, 12th, 13th, 14th, 20th to 23d, 25th to 28th.
Southern slope.—3d, 4th, 5th, 8th, 11th, 17th to 20th.
Southern plateau.—1st to 12th, 14th to 26th, 28th.
Middle plateau.—3d, 4th, 5th, 7th to 14th, 16th to 28th.
Northern plateau.—1st to 14th, 16th, 17th, 20th, 23d to 28th.
North Pacific.—1st to 11th, 14th to 17th, 23d to 26th, 28th.
Middle Pacific.—1st to 12th, 15th to 20th, 27th.
South Pacific.—2d to 12th, 15th to 19th.

ICE.

The subject of the formation of ice in the northern sections is considered elsewhere in the REVIEW under the heading "Ice in Rivers and Harbors." The following are exceptional cases of ice-formation in the southern sections of the country:—

California.—Los Angeles, 1st, 3d, 4th, 6th, 9th, 10th, 17th; Red Bluff, 3d, 4th; Sacramento, 4th to 12th, 15th to 18th; San Francisco, 5th, 6th.

Texas.—Galveston, 5th, 6th, 18th; Indianola, 4th, 5th, 17th, 18th; San Antonio, 4th, 5th.

PRECIPITATION.

[*Expressed in inches.*]

The distribution of rainfall over the United States and Canada, as determined from observations taken at more than five hundred stations, is exhibited on chart iv.

From the south Atlantic coast westward to Texas, in the extreme northwest, and in all districts west of the Rocky mountains, excepting the southern plateau, the rainfall of the month has been below the average of February. The deficiencies are very marked in the middle and north Pacific coast regions, where they are 3.80 and 5.40, respectively, and also in Florida and the east Gulf states, where the deficiency is more than two inches. East of the Rocky mountains and north of the thirty fifth parallel, excepting the extreme northwest, the rainfall has been above the average, the districts of greatest excess being the upper Mississippi and Ohio valleys and the lower lake region.

Table of Excessive, Greatest, and Least Monthly Rainfalls.

STATION.	SPECIALLY HEAVY. Date.	Amt.	Duration	Largest Monthly. Amount.	SMALLEST MONTHLY. STATION.	Amt.
Alabama.					*Arizona.*	
Mobile	23, 24	2.39			Maricopa	0.00
Arkansas.					Texas Hill	0.14
Little Rock				6.47	San Simon	0.35
Fort Smith	23, 24	2.53			Pantano	0.41
California.					*California.*	
Los Angeles	13, 14	2.42			Tulare	0.15
Connecticut.					Goshen	0.17
New London				6.02	Williams	0.18
Illinois.					Modesto	0.20
Charleston	2, 3	5.10		9.10	Galt	0.21
Cairo				8.52	Princeton	0.23
Mattoon	2	2.74		8.20	Willows	0.23
Anna	3, 4	2.72		8.19	Byron	0.25
Elmira				7.63	Brentwood	0.26
Springfield	2, 3	1.40		7.53	Chico	0.27
Bunker Hill				7.42	Orland	0.27
Swanwick	2, 3	3.70		6.66	Lathrop	0.28
Mascoutah				6.32	Niles	0.30
Morrison	15, 16	2.66			White Water	0.34
Riley	16	2.23			Dunnigan	0.35
Collinsville	1	2.00			Redding	0.36
Indiana.					Red Bluff	0.39
Dana	3	6.05		10.93	Tehama	0.39
Gosport	4	5.00		9.90	Turlock	0.39
Kokomo	4	5.62		9.85	Brighton	0.40
Frankfort	3	4.96		9.60	Delano	0.40
Wabash	3, 4	4.50		9.59	Marysville	0.40

Table of Excessive, Greatest, and Least Monthly Rainfalls.—Continued.

STATION.	SPECIAL HEAVY. Date.	Amt.	Duration	Largest Monthly. Amount.	SMALLEST MONTHLY. STATION.	Amt.
Indiana.—Cont'd.					*California.*—Cont'd.	
Wabash	17	2.26			Tracy	0.40
Worthington				9.24	Kingsburg	0.45
Union City	3	3.00		9.23	Stockton	0.45
Laconia	7, 8	2.75		8.96	Woodland	0.45
Do.	10, 11	2.25			*Colorado.*	
Mitchell	3	3.00		8.82	Fort Garland	0.30
Do.	14	2.00			Denver	0.45
New Albany	6	2.73		8.35	Pike's Peak	0.49
Griffin Station	3, 4	3.68		8.31	Fort Lewis	0.50
Rushville	4	2.21		8.31	*Dakota.*	
Shelbyville				8.23	Fort Stevenson	0.12
Marengo	6	2.05		8.13	Fort Yates	0.12
Spiceland	3	3.78		8.06	Rapid City	0.20
Martinsville	4	4.00		7.96	Smithville	0.23
Vernon	3	2.21		7.94	Fort Meade	0.30
Laporte	2	2.92		7.86	Fort Buford	0.36
New Harmony				7.85	Fort Sully	0.44
Hanover	7	2.00		7.80	Huron	0.47
Franklin	4	3.50		7.78	*Florida.*	
Danville	3	3.07		7.74	Sanford	0.00
Wells				7.72	Punta Rassa	0.01
Vincennes	4	3.24		7.69	Cedar Keys	0.04
Blue Lick				7.66	Saint Augustine	0.36
Evansville	3	2.00		7.61	Jacksonville	0.48
Connerville	3	2.50		7.56	*Minnesota.*	
Vevay	6, 7	2.00		7.56	Saint Vincent	0.24
Huntingburg				7.53	Fort Snelling	0.30
La Grange	17	3.00		7.50	Saint Paul	0.44
Montgomery	3	5.20		7.50	*Montana.*	
Degonia Springs				7.43	Terry's Landing	0.05
Lafayette	3	2.95		7.43	Fort Custer	0.09
Do.	14	2.28			Fort Keogh	0.11
Salem	3, 4	2.95		7.32	Deer Lodge	0.21
Dale				6.62	New Chicago	0.27
Greensburg	3	2.90		6.40	Fort Shaw	0.31
Monticello	3	4.35		6.27	Fort Benton	0.45
Huntington	3	4.00			Billings	0.49
Indianapolis	3	2.50			*Nebraska.*	
Jeffersonville	6	2.38			Fort Niobrara	0.40
Logansport	3	2.35			*Nevada.*	
Fort Wayne	3, 4	4.02		5.80	Brown's	0.05
Iowa.					Elko	0.05
Keokuk	16	3.56		6.13	Hot Springs	0.10
Muscatine	15, 16	3.01			Tecoma	0.15
Davenport	16	2.90			Pioche	0.28
Kentucky.					Otego	0.40
Bowling Green	7	2.25		13.10	Palisade	0.40
Do.	11	4.87			Golconda	0.45
Frankfort				10.15	*New Mexico.*	
Louisville	6	2.21		8.72	Lordsburg	0.37
Do.	10, 11	2.23			*Texas.*	
Louisiana.					Concho	0.00
Point Pleasant	11, 12	2.71		11.56	Laredo	0.00
Do.	17	2.10			Fort Davis	0.02
Do.	22, 22, 24	6.52			San Antonio	0.33
Shreveport	11, 12	1.95		7.24	El Paso	0.40
Do.	16, 17	1.80			*Utah.*	
Michigan.					Kelton	0.05
Coldwater				7.39	Blue Creek	0.10
Marshall				6.11	Terrace	0.10
Grand Haven	16	2.23			Promontory	0.20
Mississippi.					Ogden	0.33
Starkville	24, 24	2.79		8.41	*Washington.*	
Vicksburg	12	2.11		6.70	Almota	0.28
Do.	23, 24	3.14			*Wyoming.*	
Missouri.					Cheyenne	0.25
Protem				8.19		
Centreville				6.95		
Pierce City	13	2.70		7.65		
Ironton				7.45		
Saint Charles				7.10		
Saint Louis	2, 3	2.17				
New Jersey.						
Vineland				6.46		
New York.						
Albany	4	2.00				
North Carolina.						
Charlotte	17, 18	2.63				
Ohio.						
Cincinnati				8.22		
North Lewisburg	3	2.50		8.20		
Portsmouth	10, 11	2.81		8.03		
College Hill				7.50		
Jacksonburg	3	2.50		7.40		
Columbus				7.19		
Cleveland	3	3.62		6.77		
Ruggles	2, 3, 4	3.50				
Toledo	3	2.26				
Oregon.						
Fort Stevens	12, 13	2.60		8.28		
Do.	17, 18, 19	4.76				
Pennsylvania.						
Meadville	3, 4	4.50		8.90		
Grampian Hills				6.85		
Franklin	11, 12	4.12	24 hours			
Tennessee.						
Memphis	10, 11	2.08		8.09		
Nashville	6, 7	2.18		7.89		
Austin	6	2.65		7.50		
Murfreesborough				7.48		
Ashwood				7.00		
Washington Territ'y						
Fort Canby				6.60		
West Virginia.						
Helvetia	10, 11	2.80		8.18		
Morgantown	6, 7	2.13		7.07		

In the first column of the following table is given the average February precipitation in the various districts for several years; in the second column is given the average for February, 1883; and the third column shows the excess or deficiency of February, 1883, as compared with the average of previous years:—

Average precipitation for February, 1883.

Districts.	Average for February. Signal-Service observations.		Comparison of Feb., 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	*Inches.*	*Inches.*
New England	3.66	4.44	0.78 excess.
Middle Atlantic states	3.08	4.46	1.38 excess.
South Atlantic states	4.21	2.43	1.78 deficiency.
Florida peninsula	2.54	0.33	2.21 deficiency.
Eastern Gulf	5.40	3.23	2.17 deficiency.
Western Gulf	3.63	3.03	0.60 deficiency.
Rio Grande valley	1.21	0.47	0.74 deficiency.
Tennessee	5.16	5.69	0.53 excess.
Ohio valley	3.40	7.26	3.86 excess.
Lower lakes	2.20	3.94	1.74 excess.
Upper lakes	1.69	2.54	0.85 excess.
Extreme northwest	0.67	0.56	0.11 deficiency.
Upper Mississippi valley	2.01	3.59	1.58 excess.
Missouri valley	0.89	1.47	0.58 excess.
Northern slope	0.38	0.56	0.18 excess.
Middle slope	0.37	0.45	0.08 excess.
Southern slope	1.20	1.35	0.15 excess.
Northern plateau	2.67	1.23	1.44 deficiency.
Middle plateau	0.96	0.50	0.46 deficiency.
Southern plateau	0.78	0.99	0.21 excess.
North Pacific	7.15	1.75	5.40 deficiency.
Middle Pacific	4.65	0.85	3.80 deficiency.
South Pacific	2.06	1.41	0.65 deficiency.
Mount Washington, N. H.	3.71	5.65	1.94 excess.
Pike's Peak, Colo.	1.42	0.49	0.93 deficiency.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the above table of average precipitation. The Chief Signal Officer is indebted to voluntary observers for the following notes upon this subject. These comparisons are of special interest, as many of the records from which they are made cover long periods, some extending back many years before the establishment of the Signal Service:—

Illinois.—Anna, monthly rainfall, 8.19, or 4.30 above the February average of last seven years, and is 0.02 above that of February, 1882. Riley, monthly rainfall, 8.79, or 3.52 above the February average of last nineteen years.

Indiana.—Logansport, monthly rainfall, 5.76, or 2.81 above the February average of the past twenty-four years, and is, with the exception of 7.40 in 1881, the largest February rainfall of that period. The amount of snowfall, 8.65, is 1.95 below the average of February. Vevay, monthly rainfall, 7.56, or 4.24 above the February average. Only 1.00 of snow fell during the month, which is 7.10 below the average.

Kansas.—Wellington, monthly rainfall, 3.73, is 3.02 above the February average of the last four years. Yates Centre, monthly rainfall, 2.88, or 0.48 above the February average of three preceding years. The rainfall of the past winter is 0.46 above the winter average of the same period. Lawrence, Professor F. H. Snow of the state university, reports monthly rainfall, 2.31, or 1.05 above the February average of last sixteen years. The largest February rainfall of that period, 4.60, was that of 1881; the smallest, 0.19, was that of 1868. The snowfall of the month, 4.00, is 0.49 below the February average. In February, 1881, the monthly snowfall was 22.00; in 1870 and 1880, no snow fell during the month, and less than 1.00 fell during February in 1868 and 1876.

Maine.—Gardiner, monthly rainfall, 2.89, or 0.43 below the February average of forty-seven years.

Maryland.—Fallston, monthly rainfall, 5.20 or 1.76 above the February average of the last twelve years. The largest February rainfall of that period, 5.65, occurred in 1881; the smallest, 1.50, occurred in 1872.

Missouri.—Saint Louis, the Missouri Weather Service reports monthly rainfall, 6.27, or 3.80 above the February average. This amount has been exceeded in but three Februarys since 1839; viz.: 6.74 in 1851; 7.74 in 1857, and 7.21 in 1882. These months were all warm.

New Hampshire.—Antrim, monthly rainfall, 4.80, is 1.34 above the February average of ten years. The monthly snowfall, 26.5 inches, is 7.38 below the average. Grafton, monthly rainfall, 3.23, is 0.47 below the average of the last three years. The monthly snowfall, 33 inches, is about 11 more than the average.

New York.—North Volney, monthly rainfall, 3.10, or 0.38 above the February average of the last eleven years. The greatest February rainfall of that period was 4.70, in 1876; the least, 0.30, in 1877. Palermo, monthly rainfall, 3.01, is 0.20 above the February average of the last thirty years. During that period, the largest February rainfall, 7.20, was that of 1866; the smallest, 0.10, was that of 1877.

Vermont.—Woodstock, monthly rainfall, 3.20, is 0.56 above the February average of the last fourteen years. During that period, the largest February rainfall, 5.21, occurred in 1870; the smallest, 0.30, occurred in 1877. The monthly snowfall, 26 inches, is 4.97 above the February average of fourteen years. The largest February snowfall, 36.85, occurred in 1876; the smallest, 0.85, occurred in 1877.

Virginia.—Variety Mills, monthly rainfall, 2.74, is 0.10 below the February average of the last four years. Wytheville, monthly rainfall, 3.34, or 0.06 below the February average of a period of eighteen years.

The following table shows the greatest and least number of rainy (upon which rain fell) and cloudy days, and the percentages of mean relative humidity, as reported from the various districts:—

Table of rainy and cloudy days and relative humidity for February, 1883.

Districts.	Rainy days	Cloudy days.	Relative humidity.*
			Percentages.
New England	From 12 to 23	From 5 to 8	From 63.7 to 92.5
Middle Atlantic states	" 10 " 20	" 4 " 12	" 61.8 " 79.8
South Atlantic states	" 5 " 18	" 4 " 12	" 70.3 " 86.6
Florida peninsula	" 2 " 10	" 3 " 5	" 74.5 " 79.0
Eastern Gulf	" 7 " 18	" 8 " 13	" 69.4 " 81.4
Western Gulf	" 2 " 17	" 7 " 19	" 68.6 " 86.5
Rio Grande valley	" 6 " 14	Seventeen	" 63.1 " 82.6
Ohio valley and Tennessee	" 12 " 18	From 8 to 18	" 64.7 " 79.6
Lower lakes	" 13 " 26	" 11 " 18	" 68.7 " 83.6
Upper lakes	" 11 " 21	" 6 " 13	" 61.5 " 86.1
Extreme northwest	" 5 " 9	" 4 " 7	" 81.5 " 87.5
Upper Mississippi valley	" 9 " 16	" 4 " 15	" 59.0 " 86.0
Missouri valley	" 8 " 13	" 6 " 10	" 61.8 " 76.5
Northern slope	" 2 " 9	" 2 " 7	" 52.1 " 89.1
Middle slope	" 3 " 10	" 0 " 6	" 49.1 " 83.9
Southern slope	" 3 " 12	" 5 " 16	" 50.8 " 76.8
Southern plateau	" 3 " 16	" 2 " 10	" 50.0 " 67.8
Middle plateau	Eight	" 3 " 4	" 55.7 " 58.8
Northern plateau	From 1 to 12	" 0 " 8	" 70.7 " 79.5
North Pacific	" 8 " 12	" 5 " 7	" 69.8 " 75.1
Middle Pacific	" 1 " 11	" 1 " 4	" 59.5 " 77.1
South Pacific	" 5 " 10	" 3 " 6	" 51.4 " 64.6

* Relative humidity corrected for altitude.

HAIL.

The dates on which hail has been reported are as follows:—

Arizona.—Fort Grant, 20th; Tucson, 20th.

California.—Sacramento, 20th. A heavy hail storm, with thunder and lightning prevailed from 12.30 to 1.30 p. m., some of the hail being one-fourth of an inch in diameter; Cape Mendocino, 1st, 2d; Princeton, 3d; Sacramento, 1st, 14th; Salinas City, 14th; San Francisco, 13th, 14th.

Illinois.—Bunker Hill, 2d, 3d, 6th.

Indiana.—Vevay, 16th.

Iowa.—Indianola, 3d; Monticello, 15th.

Kansas.—Fort Riley, 15th; Fort Scott, 2d, 3d, 10th, 16th; Holton, 15th; Lawrence, 21st; Leavenworth, 2d; Manhattan, 15th; Yates Centre, 1st 2d, 12th, 16th.

Maine.—Cornish, 25th.

Massachusetts.—Westborough, 3d, 7th.

Michigan.—Lansing, 3d.

New Hampshire.—Bristol, 4th.

New Jersey.—Barnegat City, 5th; Moorestown, 6th, 24th; Vineland, 5th.

New York.—Ardenia, 7th; Hector, 16th; Factoryville, 3d, 24th.

North Carolina.—Brevard, 22d; Highlands, 22d; Life-saving Station No. 6, 18th.

Ohio.—College Hill, 17th; Jacksonburg, 10th; Margaretta, 14th.

Oregon.—Albany, 17th.

Pennsylvania.—Dyberry, 3d; Grampian Hills, 5th, 24th.

Rhode Island.—Newport, 18th; Point Judith, 18th.

South Carolina.—Aiken, 14th, 15th.

Texas.—Uvalde, 4th, 5th, 17th, 27th.

It is probable that some of the above reports are incorrect, and should have been recorded as sleet instead of hail.

SNOW.

The dates on which snow is reported to have fallen in the various districts are as follows:—

New England.—1st to 12th, 14th to 28th.

Middle Atlantic states.—1st to 7th, 10th, 11th, 12th, 14th to 18th, 20th, 21st, 22d, 24th to 28th.

Western Gulf.—3d to 6th, 17th, 18th.

Rio Grande valley.—5th, 17th, 18th.

Tennessee.—4th to 7th, 16th, 17th, 18th.

Ohio valley.—4th to 7th, 10th, 11th, 12th, 17th, 18th, 20th, 22d, 25th, 26th, 27th.

Lower lakes.—1st to 7th, 9th to 12th, 14th to 28th.

Upper lakes.—1st to 11th, 14th to 28th.

Extreme northwest.—1st, 2d, 3d, 8th, 10th, 14th, 15th, 16th, 19th to 24th.

Upper Mississippi valley.—1st to 4th, 6th, 7th, 10th, 11th, 14th, 16th, 17th, 19th, 21st to 24th, 27th.

Missouri valley.—1st, 2d, 3d, 6th, 7th, 10th, 11th, 13th, 15th, 16th, 20th to 26th.

Northern slope.—1st, 2d, 5th to 8th, 13th to 16th, 18th, 20th, 21st, 23d, 24th.

Middle slope.—1st, 2d, 3d, 6th, 7th, 10th, 11th, 13th to 16th, 22d, 23d, 24th.

Southern slope.—3d to 6th, 15th, 16th, 23d, 26th.

Southern plateau.—6th, 9th, 10th, 12th, 13th, 15th, 16th, 20th, 22d, 24th, 26th.

Middle plateau.—1st, 2d, 3d, 5th, 6th, 7th, 14th, 15th, 28th.

Northern plateau.—1st, 6th, 7th, 8th, 10th, 12th to 15th, 17th, 18th, 19th, 21st.

North Pacific.—1st, 11th to 15th.

Middle Pacific.—1st, 2d, 4th, 6th.

Snow also fell in the following states not included in the districts named above:—

California.—Los Angeles, on mountains, 15th; Visalia, 2d, 5th.

Georgia.—Augusta, 18th.

North Carolina.—Highlands, 22d; Murphy, 5th, 11th, 18th, 24th.

The following are reports of unusually heavy snow-storms which occurred during the month:—

Dubuque, Iowa, 1st.—The roads in this vicinity are impassable, snow being drifted over them in places to a depth of eight feet. 2d: Snow blockades exist on all wagon roads and steam railways in the surrounding country. The Chicago, Milwaukee, and Saint Paul trains, both north and south, are delayed from three to six hours. The eastern division of the Illinois Central railroad is also badly blockaded; and on the western division travel is entirely suspended, no trains having arrived from Sioux City, Iowa, since January 27th. Interruption to travel by blockades continued on the 3d and 4th, and on the 27th, trains from points east and west were again delayed by snow and sleet.

Davenport, Iowa, 1st.—Heavy snow-storm, causing delay of trains. 2d: All travel suspended on the Chicago, Milwaukee, and Saint Paul railroad; no freight trains are run on the Chicago, Burlington, and Quincy road; and the Minneapolis train on the Chicago, Rock Island, and Pacific road was unable to make trips. 4th: All railroad travel resumed, and trains again running on time.

Omaha, Nebraska, 2d.—Snow has drifted badly, but travel has been continued on all railroads except the Saint Paul and Omaha. The snow in the western counties is about three feet deep, which, unless removed by winds or a thaw, will cause serious suffering to stock.

Topeka, Kansas, 2d.—A heavy snow-storm has prevailed in western Kansas, but railroad travel has not been seriously delayed.

Cheyenne, Wyoming, 2d.—The heaviest snow-storm ever experienced in this territory has prevailed during the past four days. The snow is three feet deep in this city and from twelve to thirty inches deep on the cattle ranges throughout the territory. There being no wind, the entire surface of the ground is covered. Cattle are suffering for food, and, unless the snow is melted or blown off in places by the wind, great loss to stockmen will result. Trains on the Union Pacific road have been blockaded for the last twenty-four hours.

Lincoln, Nebraska, 3d.—The snow-storm has ended, and snow is six inches deep on the level. The railroads are partly obstructed.

Chicago, Illinois, 2d.—Trains in every direction are interfered with by snow blockades.

Milwaukee, Wisconsin, 2d.—A snow-storm has prevailed all day, causing suspension of traffic on all the northwestern divisions of railroads.

Des Moines, Iowa, 2d.—All north and south roads are blockaded; and, on the Milwaukee road, passenger trains are in the drifts between stations.

Detroit, Michigan, 3d.—The snow and rain-storm was very heavy throughout Michigan. Travel is delayed on the various railroads, and telegraphic communication seriously interrupted.

Austin, Texas, 3d.—A severe snow-storm set in this morning; temperature 12°.

Toronto, Canada, 3d.—From one to three feet of snow fell in western Ontario during last night. Passenger trains are several hours late, and freight trains are abandoned. 10th: Trains on all the main lines are running very irregularly, owing to snow blockades. Many of the branch roads are closed, and passengers and mails are carried by sleighs. At Wingham, the snow-drifts are fifteen feet deep.

Huron, Dakota.—Snow blockades continued on the railroads from the 1st to 4th, 16th, and 17th. On the 18th, trains arrived from the east, but the roads were again blockaded on the 19th and 28th.

Rawlings, Wyoming, 8th.—A stage-coach which left the Pacific Springs on the Sweet-Water line, was caught in the snow-storm of the 2d; some of the occupants perished from the cold, others were badly frozen. Snow is reported to be two feet deep on the level, and cattle are starving.

Watertown, New York, 10th.—The snowfall at this place during the winter has been ten feet, eight inches, and a great part still remains on the ground. Severe snow-storms have lately occurred, causing suspension of travel on the Rome, Watertown, and Ogdensburg railroad for the last two days. The Cape Vincent, and Sackett's Harbor roads have been closed since the 3d. The Utica and Black river road has been closed for several days, but travel was resumed on this date.

Salt Lake City, Utah, 14th and 15th.—The heavy snow-storm of these dates has caused delay of trains, and interruption to business.

Nora Springs, Iowa, 16th.—Trains blockaded by snow; also on 21st.

Grand Turk, Dakota, 16.—A furious snow-storm set in about 1 p. m., which increased in violence until it was impossible to distinguish objects at a distance of one hundred feet. All trains are abandoned; heavy drifts covering the roads.

LARGEST MONTHLY SNOWFALLS.

[*Expressed in inches.*]

The following are the largest monthly snowfalls reported from the various states and territories during the month:—

Colorado.—Pike's Peak, 4.9; Denver, 4.5.

Connecticut.—Southington, 15; Bethel, 12.25; New Haven, about 12.

Dakota.—Deadwood, 13.20; Alexandria, 8; Bismarck, 66; Wicklow, 6.

Idaho.—Eagle Rock, about 15.

Illinois.—Rockford, 13.7; Morrison, 11.5; Chicago, about 10; Polo, 8.33; Peoria, 6; Elmira, 5.13.

Indiana.—New Harmony, 15.5; Logansport, 8.65; Wabash, 4.25.

Iowa.—Nora Springs, 15; Dubuque, about 15; Monticello, 14.75; Logan, 11; Des Moines, about 11; Muscatine, 10; Keokuk, about 9.5 Cresco, 7.5; Davenport, 7.5; Humboldt, 7.45; Ames, 7; Cedar Rapids, 6.75; Indianola, 6.5; Independence, 6; Fort Madison, 4.5.

Kansas.—Salina, 4.

Maine.—Cornish, 33; Eastport, about 30; Gardiner, 24; Portland, about 20; Orono, 13.

Maryland.—Emmittsburg, 10.25; Cumberland, 10; Sandy Springs, 5.35; Woodstock, 4.9.

Massachusetts.—Rowe, 30; Worcester, 24.5 Dudley, 22; Princeton, 21.4; Westborough, 17.25; Amherst, 16.5; Charlestown, 14.5; Fall River, 14; Milton 13; Somerset, 12.5; New Bedford, 12.

Michigan.—Mackinaw City, 25.5; East Tawas, 25; Port Huron, about 23; Traverse City, 17; Ionia, 15.25; Marshall, 15.1; Alpena, 15; Lansing, 14.85; Thornville, 14; Coldwater, 11.75; Hillsdale, 10.55; Marquette, about 10; Litchfield, 5.85; Detroit, about 4.

Minnesota.—Northfield, 13; Minneapolis, 9.19; Moorhead, 7.40; Saint Paul, 4.3.

Missouri.—Corning, 7.5.

Montana.—Helena, 5.5; Fort Benton, 4.5; Billings, 4.5.

Nebraska.—North Platte, 10.2; Stockham, 9.5; Lincoln, 8.75; Utica, 7.03; Valley Home, 6.12; De Soto, 6.10; Omaha, about 6; Clear Creek, 4.75; Genoa, 4; Inavale, 4.

New Hampshire.—Mount Washington, 55.4; Ashton, about 40; Belmont, about 40; Woodstock, about 40; Wolfborough, about 40; Lake Village, 35.7; Grafton, 33; Bristol, 32.9; Contoocookville, 30; Weir's Bridge, 30; New Market, 29; Antrim, 26.5.

New Jersey.—South Orange, 14.5; Freehold, 12.6; Paterson, 12; Moorestown, 11.25; Phillipsburg, 9; Vineland, 4.5.

New York.—Oswego, 25.5; Palermo, 24; Johnsontown, 21.24; Ardena, 19.5; Buffalo, about 18; Albany, 15; White Plains, 13.6; Menand station, near Albany, 13.12; Rochester, about 13; Cooperstown, 12.5; Flushing, 11; Friendship, 10; Mountainville, 9.8; Penn Yan, 8; Factoryville, about 5; North Volney, 4.

Ohio.—Jacksonburg, 7; Canal Dover, 6; North Lewisburg, 6; Westernville, 5.5; Cleveland, 5.2.

Pennsylvania.—Dyberry, 12; Meadville, 11; Erie, about 11; Grampian Hills, 10; West Chester, 9.5; Fallsington, 8.15; Chambersburg, 8; Germantown, 8; Wellsborough, 6.94; Williamsport, about 6; Catawissa, 5.8.

Rhode Island.—Newport, about 19.

Utah.—Salt Lake City, 6.7.

Vermont.—Lunenburg, 34.5; Strafford, 32; Charlotte, 28; Woodstock, 26; Randolph, 17; Newport, 13.5.

Washington Territory.—Dayton, 7.4.

West Virginia.—Helvetia, 4

Wisconsin.—Beloit, 17.4; Milwaukee, about 17; Neillsville, 15.2; Embarrass, 13.5; Franklin, 12.5; Manitowoc, 11.5; La Crosse, 10.5; Ripon, 7.5; Madison, about 4.5.

Wyoming.—Fort Washakie, 6.5.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[*Expressed in inches.*]

Colorado.—Pike's Peak, 8.

Connecticut.—Bethel, about 3; New Haven, 1.5; New London, trace.

Dakota.—Bismarck, 3; Fort Bennett, trace; Alexandria, trace.

Idaho.—Eagle Rock, 4.

Illinois.—Riley, 8 in woods, drifts in fields; Elmira, drifts in places, most of ground uncovered; Morrison, 1.5; Polo, trace.

Iowa.—Independence, 1 to 40; Cresco, 20; Nora Springs, 13; Monticello, 12; Humboldt, 12; Ames, 9; Cedar Rapids, about 6; Fort Madison, 5.5; Indianola, about 4; Dubuque, 2.5; Des Moines, 2; Muscatine, ground about one-half covered.

Maine.—Gardiner, 26; Orono, 10; Eastport, 9; Portland, 8.

Massachusetts—Worcester, 18 in woods; Rowe, 6; Westborough, 5; Boston, 3; Mendon, 3; Dudley, 2; Provincetown, 3; Charleston, trace; Williamstown, trace.

Michigan.—Marquette, 30; Northport, 24; Traverse City, 20; East Tawas, 18; Mackinaw City, 16; Ionia, 12; Alpena, 11; Escanaba, 6; Litchfield, 3; Grand Haven, 2.5; Lansing, from 1 to 2; Thornville, in drifts; Port Huron, trace.

Minnesota.—Moorhead, 12; Saint Paul, 12; Duluth, 10; Saint Vincent, 5; Northfield, in drifts.

Montana.—Fort Keogh, 4; Fort Assinniboine, 3; Helena, 2; Fort Missoula, trace.

Nebraska.—De Soto, 1; Clear Creek, in drifts.

New Hampshire.—Mount Washington, 50; Bristol, 50; Grafton, 30; New Market, 12.

New Jersey.—Paterson, 2.

New York.—Palermo, 34; North Volney, 32 in woods; Johnsontown, 20; Cooperstown, 7; Friendship, 4; Oswego, 4; Ardenia, 3; Rochester, 2.5; Flushing, 1; Hector, 1; Albany, trace; Buffalo, trace; Factoryville, trace.

Ohio.—Cleveland, trace; Toledo, trace.

Pennsylvania.—Grampian Hills, 10; Dyberry, 9 in fields and woods; Wellsborough, 5.2; Meadville, 1.5; Chambersburg, 1; Williamsport, 1; Catawissa, trace.

Oregon.—Umatilla, trace.

Rhode Island.—Newport, 1.

Vermont.—Randolph, 36; Strafford, 36; Woodstock, 26; Charlotte, from 18 to 24.

Wisconsin.—Embarrass, 36; Neillsville, 20; La Crosse, 16; Ripon, 15; Beloit, from 0 to 12; Madison, trace; Milwaukee, trace.

Wyoming.—Fort Washakie, about 7.

SNOW FROM A CLOUDLESS SKY.

Duluth, Minnesota, 10th: snow fell from a cloudless sky at 9.30 p. m.

NATURAL SNOWBALLS.

Professor Samuel Hart, of Trinity College, Hartford, Connecticut, furnished the following interesting report:—

On Tuesday evening (February 20th) a light but damp snow fell upon the crust that had formed over the snow of Sunday's storm; and the south wind which arose at a later hour produced an unusual phenomenon. Wednesday morning the college campus, the park, and vacant lots everywhere hereabouts were seen to be strown with natural snowballs, some of them resembling spheres with diameters of from one to nine inches or more, and others looking very much like rolls of light cotton batting, having a cylindrical shape, but in nearly every case with a conical depression at each end reaching nearly or quite tothe middle. It was easy to see how the balls had been formed, as it is easy to see how boys roll up the snow for their forts. The wind had in each case started a small pellet of the moist snow, and it had rolled along until it grew so large that the wind could move it no further. The ball not only increased in diameter as it rolled, but also grew gradually in length as a little more of the snow stuck to it on each side, and thus the snow was formed into the peculiar shape described—that of a cylinder with a hollow at each end, as if a long isosceles triangle were rolled up, beginning at its vertex. The largest of the cylinders measured on the college campus had a diameter of twelve inches and a length of eighteen inches, while others in the fields in the neighborhood seemed much larger. The path of the balls could in many cases be readily traced for a distance of twenty-five or thirty feet. The snow, it should be added, was not at all closely packed, but lay together very lightly and yielded to a slight touch, so that it was impossible to move a ball without breaking it.

Observers in other parts of the city report that some balls were seen of the size of a barrel which left tracks behind them for more than sixty feet. From East Hartford it is reported that they studded the fields thickly, especially in places where the wind had a long range, and were of every size to that of a half bushel or larger. Similar balls were seen yesterday morning in many places from the Sound north to Massachusetts. All along the line of the Valley railroad they appeared on every rod of ground, and at some places they had left tracks showing that the wind had blown them in every direction, even in some cases up hill.

This interesting phenomenon, though quite unusual, has been noticed before in different places in this country and elsewhere, the most striking instance on record being one which was observed in New Jersey in 1808;

this was in the daytime, when the whole process could be watched. On this occasion some of the masses of snow which were rolled up by the wind attained a diameter of three feet. They appear to have been seen, however, over an area of only some four hundred acres, whereas the snowballs yesterday were spread thickly over many square miles.

The same phenomenon was observed at Southington, Connecticut, by L. Andrews, and at Bethel, of the same state, by Nelson Taylor.

SLEET.

The dates on which sleet is reported to have fallen in the various districts are as follows:—

New England.—3d, 4th, 6th, 7th, 11th, 13th to 16th, 18th, 25th.

Middle Atlantic states.—3d, 5th, 6th, 10th, 11th, 14th, 17th, 18th, 22d, 24th.

Western Gulf.—3d to 6th, 16th, 17th, 18th.

Rio Grande valley.—3d, 4th, 5th, 17th.

Ohio valley.—1st to 12th, 17th, 18th, 24th.

Lower lakes.—2d, 3d, 14th, 15th, 23d, 24th, 25th.

Upper lakes.—2d, 3d, 14th, 16th, 17th, 24th, 27th.

Extreme northwest.—14th.

Upper Mississippi valley.—2d to 7th, 11th, 14th, 16th, 17th, 22d, 24th.

Missouri valley.—3d to 8th, 10th, 17th, 23d, 24th.

Sleet also fell in the followng states and territories not included in the districts named above:—

California.—Cape Mendocino, 1st.

Louisiana.—Point Pleasant, 17th.

Mississippi.—Starkville, 17th, 18th; Vicksburg, 17th, 18th.

Montana.—Fort Benton, 20th.

New Mexico.—Santa Fé, 13th, 22d.

North Carolina.—Ore Knob, 17th.

Oregon.—Portland, 12th; Roseburg, 15th.

The following reports indicate the severity of the sleet-storm which prevailed from the 2d to 4th over eastern Missouri, Illinois, Indiana, northern Ohio, and western New York and Pennsylvania:—

Illinois.—Springfield, 2d: rain, freezing as it fell, continued during the day, and by the afternoon all exposed objects were covered with ice. On the 3d, the streets of the city were strewn with limbs of trees which had been broken off by the weight of ice. All of the telephone lines in the city were broken and in many instances the poles were weighed down. All telegraph-wires were down on the Chicago and Alton railroad northward to Bloomington and southward to Collinsville; on the Illinois Central, northeast to Gilman; on the Ohio and Mississippi, southeast to Pana; on the Wabash railroad, west to Kansas and eastward beyond the state line. Very great damage was done to the ornamental trees in Oakridge cemetery.

Lincoln, Logan county, 3d: there is scarcely a tree left standing in this city, many of which were snapped off short, while thousands are stripped of their branches. The sidewalks were rendered impassable by the fallen debris. Nearly all of the telephone-wires were prostrated, the poles in many places being broken. The few wires not broken were covered with a coating of ice two inches in diameter. Great damage has been done to fruit and ornamental trees. Several days will be required to remove the debris from the streets and to repair telegraph and telephone lines. Great destruction to forests is reported from the surrounding country.

White Hall, Green county, 4th: great damage has been done to orchards and nurseries in this vicinity. The telegraph and telephone are down and trains delayed.

Vandalia, Fayette county, 4th: the recent sleet-storm is without precedent in this section. All objects are covered with ice.

Champaign, Champaign county, 3d: the late sleet-storm has been the severest ever known. The damage to fruit and shade trees is very great, many of which are entirely ruined. All telegraph and telephone-wires in the city and nearly all of the poles were broken.

Mattoon, Coles county, 4th: all exposed objects are weighed down or broken by ice. Thousands of trees are either stripped of their branches or broken down; the telegraph-wires are down in all directions, and trains are run with great difficulty. Many business houses have been damaged by ice and water, and business has been greatly interrupted.

Carrollton, Green county, 4th: the limbs of trees and the telegraph-wires are covered with ice one inch thick. About twenty-five of the telegraph-wires were broken in this city.

Atlanta, Logan county, 3d: all trees and shrubbery are loaded down with ice, many of them are broken and entirely destroyed. Some of the best orchards in the county have been ruined, and stock has suffered to a great extent.

Jerseyville, Jersey county, 4th: everything is heavily coated with ice, many trees have been broken and buildings damaged. The telegraph lines are down, and trains delayed.

Clinton, De Witt county, 4th: it is impossible to accurately estimate the damage to shade and ornamental trees, and orchards in this vicinity, but is considered to be not less than $100,000. Telegraph and telephone-wires are down, but the damage in that particular is comparatively slight.

Bloomington, McLean county, 3d: the city is covered with a sheet of ice and much damage has been done to forest and ornamental trees and to the orchards. Trains on the railroads are run with great irregularity.

Indiana.—Logansport, 3d: the sleet-storm has stopped nearly all trains, and no mails arrive at, or depart from the city. The telegraph and telephone-wires are all down, and great damage has been done to fruit and shade trees. The storm is considered the most destructive that has occurred here for several years.

Kansas.—Wellington, Sumner county: ice formed on all exposed objects on the 2d, and remained until the 8th. Fears are entertained that the peach buds have been killed.

Missouri.—Saint Louis, 2d: great damage has been done by the sleet-storm, to the telegraph-wires in this city. The sidewalks are covered with ice, rendering them very dangerous to pedestrians.

Mexico, Audrian county, 4th: for thirty-six hours a very severe snow and sleet-storm has prevailed, causing great suffering to the poor classes of inhabitants and to stock. The storm is considered the severest of the kind since 1840.

New York.—Buffalo, 3d: the snow turned to rain at 1.35 a. m., which continued freezing as it fell. Ice accumulated to considerable thickness on all objects. The telegraph and telephone-wires were generally prostrated. Great damage resulted to various kinds of trees.

Ohio.—Sandusky, 3d: all exposed objects are covered with ice from one to one and one-half inches thick. None of the telegraph lines running into the city could be worked after 8 a. m. The telephone company had all of their lines broken, and many of the poles were prostrated. For a distance of ten squares every pole fell at once, causing a noise which was heard at points more than one mile distant. Over three hundred wires were broken, entailing a loss of $5,000. Much damage was also done to trees and shrubbery.

Toledo, 2d: Sleet and rain storm, covering the ground with slush from one to ten inches deep. All travel seriously impeded; trains arrive from six to ten hours late; telegraphic communication interrupted. The rain continued during the 3d, and was followed by freezing weather on the 4th, when all objects were covered with ice, resulting in much damage to shade and ornamental trees.

Cleveland, 3d: severe sleet-storm, causing serious interruption to railroad travel. Telegraph-wires and trees are broken down in all directions.

Pennsylvania.—Erie, 3d: many of the telegraph and telephone-wires in this city were broken by the accumulation of ice.

WINDS.

The prevailing direction of the winds for the month of February, 1883, at the Signal-Service stations, are shown on chart iii., by arrows flying with the wind. In the lake region and in New England, the prevailing winds are generally from the west; on the middle Atlantic coast, from the northwest; on the North Carolina coast, from the northeast, except southwest at Wil-

mington and Fort Macon; in the Gulf states, they are mostly from the north; in the upper Mississippi and Missouri valleys, from the northwest; in the northern slope, from west and southwest; in the middle plateau, from northwest, and in California they are mostly northerly.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:—

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England	Mt. Washington, N.H.	32,404	New London, Conn.	4,841
Middle Atlantic states.	Del. Breakwater, Del.	11,571	Lynchburg, V.	3,131
South Atlantic states	Hatteras, N. C.	12,159	Jacksonville, Fla	1,493
Florida peninsula	Key West	8,763	Cedar Keys, Fla.	5,258
East Gulf	Starkville, Miss.	6,865	Montgomery, Ala.	4,137
West Gulf	Galveston, Tex.	10,999	Little Rock, Ark.	3,982
Rio Grande valley	Brownsville, Tex.	8,017	Eagle Pass, Tex.	4,661
Ohio valley	Champaign, Ill.	7,379	Indianapolis, Ind.	3,764
Tennessee	Nashville	5,597	Knoxville, Tenn.	4,645
Lower lakes	Rochester, N. Y.	11,190	Toledo, Ohio	6,346
Upper lakes	Milwaukee, Wis.	9,363	Escanaba, Mich	5,529
Extreme northwest	Moorhead, Minn.	7,514	Saint Vincent, Minn.	5,152
Upper Mississippi valley	Saint Louis, Mo.	6,937	Dubuque, Iowa	2,492
Missouri valley	Huron, Dak.	6,543	Leavenworth, Kans.	3,963
Northern slope	Ft. Assiniboine, Mont	9,047	Deadwood, Dak.	1,649
Middle slope*	Fort Elliott, Tex.	6,618	Denver, Colo.	2,499
Southern slope	Fort Sill, Ind. T.	7,660	Fort Davis, Tex.	4,323
Southern plateau	Fort Grant, Ariz.	6,395	Silver City, N. Mex.	2,958
Middle plateau	Pioche, Nev.	4,835	Salt Lake City, Utah	2,590
Northern plateau	Eagle Rock, Idaho	4,536	Fort Missoula, Mont.	2,005
North Pacific	Portland, Oreg.	3,124	Roseburg, Oreg.	1,730
Middle Pacific	Cape Mendocino, Cal.	12,129	Sacramento, Cal.	3,817
South Pacific	San Diego, Cal.	4,699	Visalia, Cal.	2,249

* No record at Pike's Peak during the month.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, there was only one day during the month on which a maximum velocity of less than 60 miles per hour was recorded, viz.: 56 nw., 22d. The wind reached or exceeded 80 miles per hour as follows: 109 nw., 1st; 94 nw., 2d; 80 w., 4th; 92 nw., 5th; 80 nw., 6th; 90 nw., 7th; 84 nw., 9th; 90 nw., 10th; 98 nw., 12th and 14th; 84 w., 16th; 101 nw., 17th; 72 nw., 19th; 80 nw., 21st; 94 sw., 25th; 100 nw., 26th; 126 nw., 27th, maximum for month. On the 17th, the daily movement was 1,825 miles, or an average hourly velocity of 76 miles for twenty-four hours. This is the greatest daily movement ever recorded at this station.

Cape Mendocino, California, 52 se., 11th; 80 se., 12th; 78 se., 13th; 56 se., 17th.

Other stations reporting high winds are as follows: Indianola, Texas, 60 n., 17th; Galveston, Texas, 59 n., 17th; Portsmouth, North Carolina, 56 ne., 12th; Barnegat City, New Jersey, 52 nw., 12th; Delaware Breakwater, Delaware, 52 sw., 4th; Fort Elliott, Texas, 52 n., 16th; Cape May, New Jersey, 48 nw., 21st and 27th; Fort Grant, Arizona, 48 se., 19th; Rochester, New York, 48 n., 25th.

LOCAL STORMS.

Sandusky, Ohio, 14th.—At 4.45 p. m. a cloud of inky appearance was observed in the west approaching with great rapidity. Just before reaching the city the atmosphere became filled with a yellowish haze resembling the setting sun. At 4.57 p. m. the storm struck this place, accompanied by heavy rain. It was of about three minutes duration, during which time the wind blew at the rate of seventy-two miles per hour and caused great damage in and about the city. After the passage of the storm the wind backed to south and it became very warm.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for February, 1883, with the telegraphic reports for the succeeding twenty four hours, shows the general average percentage of verifications to be 89.49 per cent. The percentages for the four elements are: Weather, 89.02; direction of the wind, 90.45; temperature, 89.04; barometer, 89.47 per cent. By geographical districts, they are: For New England, 80.11; middle Atlantic states, 88.86; south Atlantic states, 90.54; eastern Gulf, 89.77; western Gulf, 92.31; lower lakes, 89.26; upper lakes, 90 43; Ohio valley and Tennessee, 91.34; upper Mississippi valley, 88.60; Missouri valley, 84.66; north Pacific, 80.95; middle Pacific, 92.31; south Pacific, 93.75.

There were eighty-six omissions to predict (thirteen being due to absence of reports from the Pacific coast) out of 3,444, or 2.50 per cent. Of the 3,358 predictions that have been made, eighty-two, or 2.40 per cent., are considered to have entirely failed; fifty-two, or 1.55 per cent., were one-fourth verified; two hundred and seventy-eight, or 8.28 per cent., were one-half verified; three hundred and seventy-two, or 11.08 per cent., were three-fourths verified; 2,574, or 76.66 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During February, 1883, ninety-two cautionary signals were displayed. Of these, seventy-five, or 81.5 per cent., were justified by winds of twenty-five miles per hour or more, at or within one hundred miles of the station. Seventy-two cautionary off-shore signals were displayed, fifty-seven of which, or 79.3 per cent, were fully justified; sixty-five, or 93 per cent., were justified as to velocity, and sixty-one, or 84 per cent., were justified as to direction. Twenty-nine cautionary signals were changed to off-shore signals. One hundred and sixty-four signals of all kinds were displayed, and one hundred and thirty-two, or 80.4 per cent, were fully justified. These do not include signals ordered at display stations, where the velocity of the wind is only estimated. Ten signals were ordered late.

One hundred and sixteen winds of twenty-five miles or over per hour were reported, for which signals were not ordered; many of these were high local winds or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The highest and lowest stages of water observed at the Signal-Service stations, during the month of February, 1883, are shown in the following table:—

Heights of rivers above low-water mark, February, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
Red River:	*ft. in.*		*ft. in.*		*ft. in.*
Shreveport, La	29 9	28	21 2	11	15 9
Arkansas:					
Little Rock, Ark		19	20 10	4	4 1
Fort Smith, Ark		17	14 9	9	*—2 11
Missouri:					
Yankton, Dak‡	20 0				
Omaha, Nebr‡	16 0				
Leavenworth, Kans§	21 0	26	8 9	28	6 5
Mississippi:					
Saint Paul, Minn‡	14 6				
La Crosse, Wis§	18 0	25 to 28	3 4	19	2 10
Dubuque, Iowa‡	21 10				
Davenport, Iowa‡	15 0				
Keokuk, Iowa§	14 6	19	16 4	18	13 9
Saint Louis, Mo	30 0	20	26 3	13	5 4
Cairo, Ill	40 0	26, 27	52 2	6	28 11
Memphis, Tenn	34 0	28	35 7	1 to 5	22 11
Vicksburg, Miss	41 0	28	43 2	1	24 7
New Orleans, La†	—2 6	27, 28	—3 0	1	—9 1
Port Eads, La		16	10 1	7 to 10	9 2
Ohio:					
Pittsburg, Pa	20 0	8	27 6	3	5 6
Cincinnati, Ohio	50 0	15	66 4	3	26 10
Louisville, Ky	24 0	16	44 5	3	11 2
Cumberland:					
Nashville, Tenn	42 0	13, 14	41 5	4	14 5
Tennessee:					
Knoxville, Tenn		7, 8	8 6	4	2 3
Chattanooga, Tenn	31 0	10	17 7	5	7 6
Monongahela:					
Pittsburg, Pa	29 0	8	27 6	3	5 6
Morgantown, W. Va	28 0	8	24 4	24	4 6
Savannah:					
Augusta, Ga		26	17 0	18	7 6
Willamette:					
Portland, Oreg		2, 3	16 7	7	1 8
Umatilla, Oreg‡					
Sacramento:					
Red Bluff, Cal		14	2 9	8	1 4
Sacramento, Cal		15	11 8	11	9 4
Mobile:					
Mobile, Ala		1	17 4	19, 21	14 5
Colorado:					
Yuma, Ariz		22	16 8	1 to 4	15 0

*Below bench-mark. † Below high-water mark of 1874. ‡Frozen the entire month. §Frozen part of month. See text.

The Mississippi river remained frozen during the month at Keokuk, Iowa, and at all points north of that station. At Keokuk on the 18th, the river, although frozen, rose rapidly and during the afternoon was fifteen inches above the danger-line. On the 19th, the river continued to rise, causing great alarm. During the afternoon of the 20th, the ice started but became stationary about sunset.

At La Crosse, Wisconsin, the ice was cut away from the river-gauge and observations were made after the 18th, but the river remained frozen over; the ice being twenty inches thick on the 19th, and showed no signs of breaking.

The Cumberland river rose to within seven inches of the danger-line at Nashville, Tennessee, on the 13th and 14th.

The highest stage of water was observed at Saint Louis, Missouri, on the 26th, at which time the river was three feet, nine inches below the danger-line.

At New Orleans, Louisiana, the river was within six inches of the danger-line at the close of the month. For the stages of water in the Mississippi, at stations northward to Cairo, Illinois, and in the Ohio river—see table showing daily observations, published in connection with the discription of February floods.

The Missouri continued frozen throughout the month at Yankton, Dakota, and Omaha, Nebraska. At Leavenworth, Kansas, the ice began to move on the 22d, and river observations were resumed on the 26th.

FLOODS.

The floods of February, 1883, have been very destructive, and especially so in the Ohio river and its tributaries, and in the Mississippi river south of Cairo, Illinois, but up to the close of the month the greatest damage had been done in the Ohio valley. The Ohio river was above the danger-line at Pittsburg, Pennsylvania, from the 5th to the 8th, and again on the 12th, 16th, and 17th. At Cincinnati, Ohio, the river rose to the danger-line on the 8th, and remained above until the 23d. At Louisville, Kentucky, it rose to the danger-line on the 8th, and remained above until the 25th. At Cairo, Illinois, the danger-line was reached on the 13th, and at the end of the month, the river was fifty-two feet above low-water mark and twelve feet above the danger-line; it was stationary on the 26th and 27th, and fell two inches on the last day of the month. At stations on the Mississippi below Cairo, the water had not attained its greatest height at the close of the month, but the river was above the danger-line as far south as Vicksburg, Mississippi, on the 20th.

The following reports concerning the floods which have occurred during the month have been collected by the Signal Service:—

Pittsburg, Pennsylvania, 4th.—The gorges in the various creeks at the head waters of the Alleghany broke, and at noon, the river at this place was filled with large floating ice, and was rising eight inches per hour. The water from the Alleghany backed into the Monongahela, and caused that river to rise considerably. The principal losses were to property along the Alleghany, and are estimated at $50,000. Several bridges were washed away, and railroad and telegraphic communication was interrupted. Both of the rivers continued to rise during the night, and on the 5th, the lower parts of Pittsburg and Alleghany City were submerged, causing great damage. On the 6th, both rivers fell rapidly, but the heavy rains of the 7th, caused them to rise again; several coal barges were carried down the river and sunk below the city; all of the lower parts of the city were inundated. On the 8th, the mills on the south side of the river were compelled to suspend work, and the tracks of the Pittsburg and Lake Erie, and the Allegheny Valley railroads were under water. On the 9th, the rivers fell below the danger-line.

Marietta, Ohio, 12th.—The dwellings and stores which were recently flooded are now being cleaned. The loss to Marietta is estimated to be from $50,000 to $100,000.

Ironton, Ohio, 13th.—The Ohio river began falling at this place at 1 a. m.; it lacked more than one foot of reaching the highest stage of 1847. All houses between Third and Fourth streets in West Ironton, were entered by water. The mills have stopped work. Over two hundred families were driven from their homes. The track of the Scioto Valley railroad was covered. No trains have arrived from Sciotoville, Ohio, since the 10th.

Portsmouth, Ohio, 12th.—The Ohio river is sixty-four feet and still rising; all business suspended on this date. The water was four feet deep in the Western Union telegraph office. A vast sheet of water extended from the north side of Second street to South Sixth street, which is the only place in the city where the water has not reached. Three-fourths of the city is under water. Public schools were closed and court adjourned. The citizens relief committee cared for over six hundred persons who were rendered destitute.

Maysville, Kentucky, 12th.—At 4 p. m., the Ohio river was within twenty-two inches of the great flood of 1832, and within eighteen inches of that of 1847. The water on the Fleming turnpike, at a distance of one mile from the city, is five feet deep. All mills, factories, foundries and coal elevators were compelled to abandon work. The village of Chester, about two miles southeast of Maysville, is completely submerged, and a large part of East Maysville is also covered.

At Cincinnati, Ohio, the river rose to the danger-line on the 8th, and continued to rise rapidly. At 1.30 p. m. of the 11th, the river had risen to sixty feet, nine inches; being ten feet, nine inches above the danger-line. The lower part of the city was inundated for a distance of four squares from the river front. Great quantities of merchandise and household goods were ruined, and several walls were undermined. In the evening, the gas-works were compelled to shut down, leaving the city in partial darkness. All of the engines at the water-works were stopped, the water covering the floors of the building. The superintendent and engineer of the city water-works issued an appeal to the citizens, requesting an economical use of water, there being only six day's supply in the reservoirs. Business in the lower parts of the city was suspended, and all efforts were made by the merchants to remove their wares to places of safety. A large number of dwellings were flooded, compelling the occupants to seek shelter at the police-stations, many of whom escaped with nothing but their clothing. The cities of Covington and Newport, on the Kentucky shore were partly flooded, compelling the residents of the submerged localities to remove to higher ground. In Newport, from 2,000 to 3,000 people were driven from their homes, many of whom were sheltered in the court-house, school-houses, and other public buildings.

On the 12th, the river rose steadily, increasing the disasters and prostration to business. Associations of charity were organized for the relief of those rendered destitute. At Covington, Kentucky, on the opposite shore, the gas was cut off at 10 p. m., and the water-works were compelled to stop. The damage to Covington property, to date, is estimated at $75,000. At 10.30 p. m., the river reached the highest point of the great flood of 1832. But few of the railroads were able to run trains in or out of the city, and steamers were engaged to ply between this city and other points where connection with the various roads could be made with convenience. Cumminsville, a suburb of Cincinnati, is almost entirely under water, and the inhabitants are moving to higher ground, or to the second floors of their dwellings.

On the 13th, the river rose to sixty-five feet, one inch, and during the evening, there was a slight fall. Large quantities of debris of various kinds were carried down the river; one saw-mill and several houses were swept past the city by the current. All railroad communication was cut off; passengers were carried in vehicles to reach the cars at points outside the city. Relief-boats were used for distributing food, etc., to the people who remained in the upper stories of their dwellings. A large part of the Southern railroad depot sank into the water, together with a section of the track and a number of

freight-cars. The damage to the depot and surrounding buildings, with their contents, will aggregate $10,000. The depot was built upon "made ground," and a hollow west of it had been filled with water for several days previous to the accident, which gradually undermined the building.

14th.—At 1.30 p. m., the height of the river was sixty-five feet, three inches. All of the railroads were under water except that of the Cincinnati, Hamilton, and Dayton company. No change occurred on the street-railways; the cars continued to run on the lines not heretofore abandoned. In this vicinity about 2,500 houses have been submerged, of which number more than 2,000 were in Newport, Kentucky. The associated charities are very active in their efforts to relieve the destitute. The Ohio legislature, on this date, passed a bill authorizing the loan of $100,000 for the relief of the flood sufferers.

15th.—At 4.05 a. m., the highest point, sixty-six feet, four inches, was reached, and the river remained stationary until 6 a. m., when it began to fall slowly.

On the 16th, the Plum-street depot was filled with water to depth of about twenty feet. The city still remains in darkness. At 1.30 p. m. of the 17th, the river was sixty-two feet, two inches, being two feet, one inch lower than at the same hour of the previous day. In the "Cincinnati News," of this date appeared the following note in reference to the value of the flood-warnings given by the Signal Service:

> The United States Signal-Service department has been of great service during the flood, * * * * * and their timely warnings have been instrumental in saving over $1,000,000 worth of goods, in this city alone. Each rise has been prophesied from twelve to twenty-four hours in advance of its arrival, and the merchants promptly notified, thus enabling them to remove to places of safety. * * * * * Those most benefitted by these admonitions recognize their value and fully appreciate the services rendered. The observer in charge of the signal office in this city has worked diligently to place his bulletins before the public, * * * * * and to him the merchants of the city have tendered their thanks.

18th.—The river fell one foot, ten inches during the twenty-four hours, ending at 1.30 p. m., being six feet below the highest point reached.

19th.—The river fell one foot, five inches during the twenty-four hours, ending at 1.30 p. m. The work of clearing dwellings and business houses in the overflowed districts has begun.

20th.—A fall of one foot, six inches, has occurred during the twenty-four hours, ending at 1.30 p. m. The gas companies are again able to furnish the city with gas, none having been supplied since the 11th.

21st.—The river, at 1.30 p. m. had fallen one foot, eight inches, during the preceding twenty-four hours, being at that hour, fifty-five feet, nine inches above low-water mark. In the "Cincinnati Commercial Gazette," of this date, is published an itemized estimate of damages caused by the flood. Reports from one-half of the submerged district show that the actual damages will aggregate about $800,000; and it is estimated that the total loss will reach $1,500,000. The losses resulting from the suspension of business is considered much greater than the value of the property destroyed.

22d.—During the last twenty-four hours, the river has fallen two feet, eight inches. The chief of police reports the total number of inundated business houses in the submerged districts to have been, 1,548; residences and tenement houses, 2,548; passenger and freight depots, seventeen; police-stations, two; coal yards, fifteen.

23d.—The effects of the floods upon the railroads have now been practically removed, and all through and local trains are again running on schedule time. The river has fallen nine inches below the danger-line.

Lawrenceburg, Indiana, 12th.—At 4 p. m., this city was entirely cut off from all kinds of communication, with the exception of an occasional steamer. The city was surrounded by water generally ranging from twenty to sixty-five feet in depth; at the highest point within its limits the water was at least five feet deep, and swift currents rushed through the streets. The citizens were compelled to take refuge in churches, factories, and other places of safety.

13th.—The continued rise in the river has compelled more families to desert their houses. Between 5,000 and 6,000 persons have been rendered dependent upon the outside world for food, all of the supplies being under water. Great suffering from hunger and exposure is experienced.

14th.—The river began falling slowly during the morning. In the evening, one end of a furniture warehouse on High street fell in; about thirty persons were sheltered in the upper stories of the building, all of whom escaped uninjured. The warerooms were stored with $20,000 worth of furniture, which will prove almost a total loss. The market-house, with $10,000 worth of furniture, was swept away.

20th.—As the water recedes, the damage to property becomes more apparent. At least one-half of the householders will lose all of their effects. The following are some of the heaviest losers: Henry Fitch, lumber, $20,000; Ohio Valley Coffin Company, $10,000; Graham & Marshall, lumber, $12,000; E. B. Dobell, furniture, $5,000; Baldwin & Dobell, furniture, $3,000; and Snyder's carriage factory, $2,000. The individual losses cannot be estimated, but will aggregate an immense sum. The buildings entirely destroyed are as follows: Eight manufacturing establishments; three barns, and forty dwellings. Those swept from their foundations are: One hundred and seventy-nine dwellings; one hundred and thirty-three barns; nineteen shops; six business houses, besides Floral Hall, at the Fair Grounds, and innumerable outbuildings and sheds.

Aurora, Indiana, 14th.—The river reached a point three and one-half feet above the great flood of 1832, and at 10 p. m. began to fall. Many dwellings have been flooded or swept away.

Hamilton, Kentucky, 15th.—The Ohio river at this point is rapidly rising, and the village is totally submerged. Nearly all families have deserted their homes. Normansville, a small village about one mile from the river, is inundated, and all dwellings have been abandoned. The back-water is doing great damage along the creeks for miles into the country.

Vevay, Indiana.—The water attained its greatest height at this place on the 15th, being thirty-nine inches above the great flood of 1832. Many citizens were driven from their homes, and houses, barns, fences, and other movable objects swept away.

Madison, Indiana, 12th.—The Ohio river is now within thirty-four inches of the great flood of 1832, and is rising at the rate of two inches per hour. The depot and all of the factories and houses on the river front are inundated.

Jeffersonville, Indiana, 14th.—There are only about eight blocks in the city that are not under water. All of the public buildings are filled with people rendered homeless. Much damage has been done at the two ship-yards, and at the glass-works the loss is estimated at $100,000. The Ninth-street depot is standing in nine feet of water.

16th.—Additional numbers of families have left their homes for places of safety. The destitute are now supposed to number 7,000. The central part of the city is ruined and there can be no estimate of the amount of damage. Great suffering from hunger and exposure prevails.

Louisville, Kentucky.—The first telegram from the Chief Signal Officer, giving warning of the approaching flood was received on the morning of the 5th, and was bulletined in the city. At this time, the river was more than ten feet below the danger-line. It fell six inches during the succeeding twenty-four hours, after which it rose rapidly. During the twenty-four hours ending at 1.25 p. m. of the 8th, it rose eight feet, eight inches, the gauge then reading twenty-four feet, five inches, or five inches above the danger-line.

9th.—During the last twenty-four hours the river rose four feet, three inches.

10th.—The river continues to rise, and has flooded a number of houses on the river front, causing suspension of business in that locality.

11th.—The river is now ten feet, eleven inches above the danger-line and continues to rise.

12th.—A rise of two feet, nine inches has occurred during the last twenty-four hours. Several thousand people have been driven from their homes by the encroaching water. At 11 p. m., the cut-off dam was broken. This dam was forty feet thick at the top, increasing to two hundred feet at its base, and was 2,000 feet in length. It protected a valley extending to Jackson street and from the Short-Line railroad fill almost to the river, where there is a high levee. The back water which pressed upon the dam at the "cut-off" extended back as far as the eye could reach, and was sixty feet deep. In the valley mentioned there were two hundred and fifty houses, mostly of light frame structure, and in five minutes after the bursting of the levee, not a house remained standing. The scene was a frightful one, being intensified by darkness, as every light was almost instantly extinguished.

13th.—The river has risen three feet and four inches during the last twenty-four hours. People are busily engaged in constructing rafts, for the purpose of removing furniture, etc. All of the mills and factories fronting on the river have stopped. Great distress has been caused in the overflowed district. Along Front street, the water is up to the second stories of the houses, and in Portland, a suburb of Louisville, an area of ten squares is under water.

14th.—The river continues to rise, and the situation becomes more serious. At 9.25 p. m., the river marked forty-two feet, nine inches, surpassing the great flood of 1832. Up to this date, nine persons are known to have been drowned.

15th.—The height of the river, this morning, was forty-three feet, five inches, or more than nineteen feet above the danger-line. Further damage has been done by the overflow of Bear-grass creek, which runs through the eastern part of the city. The whole of Brent street was flooded to a depth of about ten feet and resulted in the bursting of several sewers. During the day, a frame church building and several houses were loosened from their foundations, and were floated down the river. Many houses were saved by anchoring them to trees, telegraph poles, and other objects. Relief-boats supplied food to the destitute at many points along the river.

16th.—The river reached its maximum height this evening, being forty-four feet, five inches on a temporary gauge, (all others gauges are covered;) it is probable that this reading is four or five inches too low. The city gas-works were submerged during the evening, leaving the city in darkness. The amount of damage done in this city as compiled by the "Courier-Journal" is estimated at $367,500. The present flood has reached a point three feet higher than that of a great flood of 1832.

17th.—A fall of four inches has occurred during the last twenty-four hours. The situation remains unchanged; no further damage has been done, with the exception of the washing away of a few old buildings.

18th.—The river has fallen one foot, three inches and is still receding. The gas company is yet unable to supply the city with gas.

19th.—The river continues to fall, and there is now less than three feet of water on Fulton street. The water over the lowlands having no outlet except through the small sewers, is passing off very slowly, and it will be weeks before people can return to their homes.

20th.—The river continues to fall at the rate of one and one-half inches per hour. The water-works resumed operations today, not having sustained the least damage during the flood. The city is now partly supplied with gas.

21st.—At 1.25 p. m. the river marked thirty-six feet, seven inches, and was falling one and one-half inches per hour. It is thought that business will be resumed on Front street in about one week. At Point Portland and Shipping Port, it will require weeks of labor and thousands of dollars to repair the damage done. The damage to the cut-off dam is estimated at $30,000.

During the twenty-four hours ending at 1.25 p. m. of the 23d, the river had fallen three feet; it continued to fall rapidly and was again below the danger-line on the 25th.

New Albany, Indiana, 12th.—During the last twenty-four hours, the water has entered the Depauw American Plate-glass works, and has ruined every furnace in the entire twenty-five acres of the works. All of the furnaces will have to be rebuilt; the loss is estimated at $100,000. Three-fourths of the factories in the city and not less than five hundred houses have been flooded, causing a loss of at least $250,000. From 2,500 to 3,000 employes of the factories are out of work. The track of the Air Line railway, in the west end of the city, was six feet under water and preventing trains from entering.

16th.—The water is now nearly three feet higher than the great flood of 1832. The distress and suffering are very great. The damage is estimated at $1,000,000, and 5,000 people are homeless.

20th.—The total number of families in the city who are being provided with daily supplies by the relief committee, and who will be dependent upon them for several weeks, is officially reported to aggregate 2,071. It will cost $200,000 to repair buildings. The city loses heavily in sewers and bridges. Previous reports of damages have not been exaggerated, and the losses to the city will not be less than $1,000,000.

26th.—The receding river discloses a great amount of damage that has been hidden by the water.

Evansville, Indiana, 16th.—The river is rising rapidly, and this evening marks forty-seven feet. The Louisville and Nashville yards are covered with water, and all work is stopped. The water is backing up into the sewers and is forcing its way into the streets. Reports from Posey county state that nearly the whole of Bethel township is under water.

26th.—The river is falling very slowly, and is not more than two feet lower than the highest point reached here.

Caseyville, Kentucky, 26th.—The town is completely inundated, excepting a few residences on a high bluff. All of the business houses are under water, and the stocks of goods ruined.

Shawneetown, Illinois, 24th.—The water in the river is five feet higher than ever before known, and is still rising. The town has been under water for three weeks. The river is from five to thirty miles wide, and it will be several weeks before the water will subside. Several hundred houses have been swept away and hundreds of people are without homes, food, or clothing. The actual loss in this immediate vicinity will exceed $250,000.

26th.—Almost the entire population is now confined to the upper stories of their dwellings. The river is still rising, owing to the great volume of water from the swollen Wabash.

The preceding reports are from stations situated along the Ohio river, and are arranged in the order in which they would be successively passed proceeding southward from Pittsburg.

The Signal-Service observer at Cairo, Illinois, reports as follows: The stage of water in the Ohio river on the 26th and 27th,—fifty-two feet, two inches,—is the highest water ever recorded at Cairo, and is three and one-half inches above the highest point of the flood of 1882, which occurred February 25th and 26th The present flood has submerged the lowlands to a vast extent in the immediate vicinity of Cairo, causing loss of stock, the value of which will amount to thousands of dollars. At Bird's Point, a small settlement on the Missouri shore near the mouth of the Ohio, a few houses have been crushed by the heavy driftwood and floating ice. At the latter place, a number of persons were compelled to abandon the lower stories of their dwellings. The telegraph and railroad companies also sustained losses in consequence of the flood. The telegraph company had a large number of poles washed away, and the railroads were badly damaged. The city of Cairo has sustained but little or no loss as regards property. From $3,000 to $4,000 have been expended in bulkheading and guarding the levees surrounding the city, (a distance of about seven miles.) These bulkheads are built on the top of the levees, and are constructed by driving stakes into the earth a few feet apart and nailing planks to the uprights, against which an embankment of earth is thrown on the side

from the river. The same means were employed at Mound City, Illinois, eight miles above Cairo, and successfully prevented the overflow. Mound City was submerged by the flood of 1882. The depth of water on the bulkheads during the recent high stage of water varied from two inches to two feet. As the greater part of Cairo is from ten to sixteen feet below the levees, an overflow would result most disastrously. Much property has been saved by the warnings furnished by the Chief Signal Officer.

Columbus, Kentucky.—The levee at this place broke on the 17th, and on the 21st, the town was submerged to an average depth of ten feet. All business has been suspended, only two business houses and a hotel being above the water. The track of the Saint Louis, Iron Mountain, and Southern railroad is washed away between here and Charleston, Missouri. Great losses of stock have occurred in the bottom lands above and below here. Belmont, Missouri, on the opposite shore, is also submerged.

Memphis, Tennessee, 11th.—A telegram from the Chief Signal Officer was received on this date, announcing dangerous floods in the Ohio river, and copies were furnished to the press and to the exchanges. On the 14th and 15th, additional telegrams were received from the Chief Signal Officer, predicting dangerous floods in the Mississippi at and below Cairo, Illinois, and advising the removal of property to points above the danger-line. These telegrams were also furnished to the press and the exchanges. The following reports show to what extent the flood prevailed at this station during the remainder of the month:—

19th.—The river has risen seven inches during the last twenty-four hours; it is now within eight inches of the danger-line, and two feet, nine inches below extreme high-water. The water is going through the breaks at Trotter's, eighty-five miles below, and also at Friar's Point, Mississippi. The warehouses at Concordia, Mississippi, which are located between the river and levees, are surrounded by water. Up to this date, no loss has been sustained between Memphis and Cairo. The levees between Friar's Point and Arkansas City have been made three feet higher than they were last year.

21st.—A rise of six inches occurred during the last twenty-four hours, and the river is three inches above the danger-line. The high water is doing serious damage to the corn that is piled up along the river bank, awaiting shipment. The water, in many places, covers the second layers of sacks, and thousands of bushels will necessarily be ruined. Suspension of work has also been caused on the proposed Kansas City, Springfield, and Memphis railroad.

22d.—The river is nine inches above the danger-line, having risen six inches during the last twenty-four hours.

23d.—Suspension of travel has been caused over the Memphis and Louisville railroad from this city to Madison, Arkansas, a distance of forty miles westward. The back-water from Ten Mile Bayou covers the track to a depth of six inches and is rising rapidly. The local packets are busily engaged in removing laborers and stock to places of safety, as the water is encroaching upon several farms below Memphis and Helena, through the breaks that were not repaired. None of the newly-built levees have shown any indications of breaking.

24th.—It is now a certainty that all that country from New Madrid, Missouri, to Helena, Arkansas, and from the river westward to Crowley's ridge will be inundated. This area is about two hundred and twenty-five miles in length with an average width of forty miles. Thousands of bushels of corn will be lost, and large numbers of mules, horses, cows, and hogs will be drowned. There yet remains considerable cotton in the fields, which will also be lost together with the cotton-seed.

26th.—The water is within seven inches of extreme high water. No further damage to levees has been reported.

27th.—No change has occurred in the river during the last twenty-four hours. The back-water is still rising rapidly in the lowlands, causing loss of stock. Steamers use every precaution in passing levees that are weak, as the waves from the boats have a tendency to loosen the earth. The river rose two inches on the last day of the month.

Helena, Arkansas, 23d.—The Mississippi continues to rise at the rate of five inches in twenty-four hours. The overflow in Crittenden county has stopped the running of trains over the Memphis and Little Rock railroad. The lowlands are being rapidly covered with water. Reports from Austin, Tunica county, Mississippi, state that the water from the river is rushing through the breaks at that place, and the inhabitants are leaving for higher localities.

24th.—Reports from Lee county, Arkansas, state that the Saint Francis river is rising rapidly. The whole country for a distance of eight miles from the mouth of the river, with the exception of a small piece of ground, is under water. No great damage has yet occurred, and if the water recedes by the middle of March, good crops may be made. The water is rapidly covering the country north of the Helena levee, one and one-half miles north of here, and has reached the road at the base of hills running to Phillips Bayou. The inhabitants in this locality are moving their stock and making fast their possessions to prevent them from floating away. Paramore road at Clarendon is under water and the town is becoming rapidly flooded.

27th.—The river has risen three inches during the last twenty-four hours, and the water is now even with Front street and on a level with the entrances to the business houses on a part of Main street. Preparations are being made to prevent further encroachment by throwing up temporary levees. The levee below Helena is still firm and intact. The Saint Francis and White rivers are still rising, and the people are preparing to secure their houses and other property.

Vicksburg, Mississippi, 21st.—The river is within one foot of the danger-line. No alarm is felt as it will require a rise of three feet to overflow its banks at all points in this section.

27th.—The lowlands in Louisiana are reported to be submerged; but little damage has, so far, occurred.

The above reports are from stations located on either side of the Mississippi between Cairo, Illinois, and Vicksburg, Mississippi. The following are reports of damaging floods occurring mostly in the smaller rivers and streams, and will be found arranged by states, in alphabetical order:—

Arkansas.—Clarendon, Monroe county: the White river at this place has begun to overflow, and threatens to flood the lower parts of the town. No efforts have been made to strengthen the levees at this place.

Illinois.—Clinton, De Witt county, 20th: reports from central Illinois, state that the large streams are rising, and great damage is threatened. Many fields of wheat have been ruined by the overflow, and the damage to various kinds of property is estimated to be from $40,000 to $60,000.

Springfield, 16th: The melting of snow and the late heavy rains have swollen the streams in this vicinity, causing great destruction of property and loss of life. The city water-works were submerged during the morning, and the pumping was discontinued.

Jerseyville, Jersey county, 16th: The bottom-lands and creeks in this vicinity are flooded. Macoupin and Phills creeks are higher than ever known. Great damage has been done to railroads, and travel has been delayed.

Peoria, 16th: No damage has been done by floods at this place, but lower Peoria, known as Goose lake, is flooded and the people are moving out. The railroad bridge at Kickapoo creek has been washed away. The Chicago, Rock Island, and Pacific railroad track is flooded north of this place. Trains are water-bound between Princeton and Stark. Two bridges on the Chicago, Burlington, and Quincy road have been washed away.

Champaign, Champaign county, 16th: All streams in this vicinity are much swollen and are overflowing their banks.

Indiana.—Lafayette, Tippecanoe county, 16th: The flood in the Wabash is unprecedented. The river is twenty inches higher than ever known and is still rising. The machinery at the water-works is submerged and the city's water supply is cut off.

Wabash, Wabash county, 20th: At 7 p. m. of this date, the river rose to high-water mark of 1875, and is still rising. The levees are broken in many places, and a large part of the country is flooded. The McNeil levees, six miles below here, broke during the night and the water covered the lowlands, sweeping away fences, corn, hay, stock, etc. Great damage has been done to the various railroads by washing away the tracks and bridges and flooding the road-beds.

Iowa.—Davenport, 16th: the heavy rains have caused washouts on the railroads, and all creeks are swollen, causing delay of travel. Duck creek rose twenty eight feet, covering the railroad with several feet of water, and lodging large cakes of ice upon the track.

Keokuk, 16th: the lowlands and railroad tracks are flooded in this vicinity, and several bridges have been washed away.

Kentucky.—Cynthiana, Harrison county, 12th: the Licking river continued to rise until midnight, when it became stationary. Communication with the surrounding country, east and west of the town is entirely cut off. Several distilleries and flour-mills were surrounded by water and compelled to shut down.

Boston, Nelson county, 12th: the Licking river, at 9 a. m., was twenty-nine feet, four inches, being the highest point reached during the last ten or fifteen years. At 1 a. m., it began falling slowly. But little damage was done, other than the sweeping away of grain and fodder stacks.

Frankfort, 12th: the Kentucky river is forty-two feet and falling here and at all points above. The river reached a point four feet higher than has ever been known. All distilleries and saw-mills were closed, and great damage has been done to property.

Owingsville, Bath county, 15th: the recent floods have done very great injury to the farmers in this vicinity. Slate creek, near this place, rose to a height two feet higher than was ever known, sweeping away barns, fencing, corn, fodder, etc. The town of Wyoming in this (Bath) county, near the confluence of Slate creek and the Licking river, was entirely submerged. The water rose so rapidly that the inhabitants were compelled to make their escape in boats. At Farmer's, Rowan county, several dwellings and store-houses were washed away. The loss to farmers along the course of Slate creek, in Bath county, alone, is estimated at $100,000.

Missouri.—Kansas City, 16th: the heavy rains of last night in this vicinity have caused serious damage to railroads; washouts have occurred, and travel has been delayed.

Marshall, Saline county, 16th: Salt Fork, a small stream in this county, has overflowed its banks and is over a mile wide at points east of here. Trains are delayed on the Chicago and Alton railroad. The bridge, three miles east of the city, is submerged and the creek at that place is one mile wide.

Hannibal, Marion county, 16th: the thaw of the past two days and the recent heavy rains have proved disastrous to the railroads running into this city. Great damage has been done along the line of the Keokuk and Saint Louis railroad. During the morning, the bridge across the Des Moines river at Buena Vista fell into the river. The streams in this vicinity are much swollen and all railroads are inconvenienced.

New York.—Buffalo, 17th: the second, third, eighth, and thirteenth wards of this city are almost completely inundated, and the Delaware, Lackawanna, and Western railroad bridge is submerged. The lands in the vicinity of the race-track were under four feet of water. Large numbers of pigs and other animals were drowned. No trains have passed over the Buffalo, New York, and Philadelphia road since yesterday afternoon. The Elk-street crossing of the Lake Shore and Michigan Southern railroad is under two feet of water.

Lockport, Niagara county, 17th: the water in Eighteen Mile creek rose fifteen feet, and has swept away the Watertown and Ogdensburg railroad bridge, and also a highway bridge and dam. The loss in this vicinity up to date is $75,000.

Rochester, 17th: washouts have occurred on the Rochester and Pittsburg railroad at Gainesville, and also on the Buffalo, New York, and Philadelphia railroad at Arcade and other points; all trains have been laid up on the siding.

Ohio.—Columbus, 5th: the Scioto river rose rapidly all day and continued to rise during the 6th, reaching the highest point ever known on the latter date. A large part of the city, mostly on the west side was flooded. Fifty families were driven from their homes and were sheltered in the school-houses, churches, and other buildings. On the 7th, the river fell slowly, but rose rapidly again on the 11th, causing no damage.

Sandusky, 3d and 4th: the heavy rains have caused all streams to rise rapidly. The Sandusky river rose twenty feet in three hours on the 4th, washing away several bridges. In the town of Fremont, Sandusky county, the water was five feet deep in the principal hotel. All trains were delayed from twenty-four to thirty hours, and the telegraph lines sustained serious damage.

Massillon, Stark county, 15th: the entire trestle-work over the Tuscarawas river at Willow Creek coal-mine was carried away. The Cleveland, Tuscarawas valley, and Wheeling railroad bridge at Bavis Mills, which was recently washed away and replaced, was again carried away. Many stores and cellars of buildings in Massillon were flooded, and all the dwellings near the rolling-mill submerged.

Pennsylvania.—Erie, 3d: the creeks in this vicinity have overflowed their banks, causing interruption to travel and damage to property. In some of the houses on Mill creek, the water rose to the second stories compelling the occupants to leave them.

Lock Haven, Clinton county, 17th: the river at this place has stopped rising, but the flats are covered with water to a depth of several feet, compelling farmers to send the stock to the hills to prevent drowning.

Tennessee.—Nashville, 11th: the river is rising steadily with heavy drift floating; fears are entertained of an overflow.

13th: the river continues to rise. A few houses in the eastern and northern parts of the city are flooded. The backwater over the lowlands in the city is from twelve to seventeen feet deep.

For the purpose of showing the stages of water in the Ohio and Mississippi rivers during the prevalence of the floods, the following table has been prepared. The observations were made simultaneously on each day of the month at 2 p. m., Washington mean time:—

	Ohio river.						Mississippi river.					
Station.	Pittsburg.		Cincinnati.		Louisville*		Cairo.		Memphis.		Vicksburg.	
	Feet.	In.	Feet.	In.	Feet.	In.	Feet.	In.	Feet.	In.	Feet.	In.
Danger-point	20	0	50	0	24	0	40	0	34	0	41	0
February 1	7	8	28	11	11	8	29	10	22	11	24	7
2	6	4	28	1	11	6	29	8	22	11	26	8
3	5	6	26	10	11	2	29	6	22	11	28	4
4	15	2	31	0	12	0	29	10	22	11	29	7
5	24	9	31	1	13	6	29	7	22	11	30	5
6	20	1	29	6	13	0	28	11	23	0	31	1
7	20	8	43	9	15	9	29	7	23	1	31	7
8	26	9	52	10	24	5	31	7	23	0	31	10
9	18	0	57	4	28	8	33	3	23	4	32	1
10	12	1	59	1	31	7	34	8	24	5	32	5
11	10	10	60	9	34	11	36	7	25	11	32	7
12	20	7	63	7	37	8	38	7	27	3	33	3
13	17	5	65	0	41	0	40	1	28	7	34	0
14	12	9	65	3	42	6	41	8	29	9	34	8
15	19	2	66	1	43	9	43	10	30	7	35	7
16	20	8	64	3	†44	5	45	7	31	5	36	7
17	20	3	62	2	44	1	47	8	32	3	37	5
18	19	9	60	4	42	10	49	4	32	9	38	3
19	16	3	58	11	40	5	50	9	33	4	38	10
20	13	3	57	5	38	10	51	7	33	9	39	5
21	11	1	55	9	36	7	51	10	34	3	40	0
22	9	6	53	4	34	0	51	9	34	9	40	5
23	8	1	49	3	31	0	51	10	35	1	40	10
24	7	1	44	9	27	8	52	0	35	4	41	4
25	7	2	41	9	23	0	52	0	35	5	41	8
26	8	5	37	8	21	8	52	2	35	6	41	10
27	8	3	34	4	17	6	52	2	35	6	42	0
28	7	2	30	8	13	0	52	0	35	7	42	2

* Regular gauge submerged from 8th to 25th, inclusive; observations made at foot of 9th street, and at temporary gauges. † Probably four or five inches too low.

HIGH TIDES.

New York City, 18th, high tide, flooding cellars in West street; Cape Lookout, North Carolina, 20th, 24th.

LOW TIDES.

Cape Lookout, North Carolina, 10th, 15th, very low.

ICE IN RIVERS AND HARBORS.

Penobscot bay.—Bangor, Maine, 4th, the bay is frozen over at Belfast for the first time since 1876.

Thames river.—New London, Connecticut: ice around the docks on 1st, 2d, 3d; ice cleared from docks, 4th; floating ice, 15th.

Passamaquoddy bay.—Eastport, Maine: floating ice in bay 21st, 22d.

Hudson river.—New York City: 1st, a canal-boat, laden with two hundred and eight tons of coal, was sunk in the harbor by ice on this date; 4th, floating ice in river.

Susquehanna river.—Port Deposit, Maryland: 4th, reports from points north of this place, state the river is rising and the ice breaking up, causing great alarm. All of the rolling-stock on the sidings of the various railroads was sent to Canal station, about two miles north. The back-ice from Peach Bottom reached this place about 6 a. m., breaking up the ice between the depot and Rock river. The ice at the lower end of the town is firm, and still holding the heavy pressure of back-ice; 6th, the back-ice is now packed from shore to shore, for a distance of three miles, and is from five to six feet in depth. The ice between Mount Ararat and Havre de Grace still remains firm and unbroken; 17th, the track of the Columbia and Port Deposit railroad is obstructed by water and ice, the latter being piled up to a height of eight feet in places. At McCall's Ferry, twenty-two miles north, the river rose three and one-half feet in twenty minutes. The ice that was dammed for a distance of twelve miles north of that place, is breaking away and moving down the river.

Williamsport, Pennsylvania: 16th, ice is dammed a few miles north of here; 17th, some ice moved to-day, but the ice-dam still remains firm.

Wilkesbarre, Pennsylvania: 20th, the ice has gone out at Nanticoke, but there are no signs of its moving at this place.

Cuyahoga river.—Cleveland: 3d, the ice gave way and passed into the lake without serious damage. During the night an ice-dam formed at the Seneca-street bridge, causing the back-water to overflow the lumber yards and wharves. Heavy dams also forms at the other bridges on the river. The Cleveland, Columbus, Cincinnati and Indianapolis railroad bridge was saved by running heavily loaded cars upon it. 13th, ice-dam formed at the mouth of the river, the ice being packed from the surface of the water to the bottom of the river. 14th, ice-dam at the mouth of river gave way and moved into lake. 15th, an immense dam formed at the weigh-lock, causing the water to overflow the surrounding valley.

Grand river.—Grand Haven, Michigan: 2d, river partly open.

Maumee river.—Toledo, Ohio: 4th, great damage by breaking up of the ice is reported from points above the city; river remains frozen over at this city. On the 17th, at 11 a. m., the ice gave way in front of the city; at about noon an ice-dam formed below the city; at 12.30 p. m., a span of the Cherry-street bridge, and two spans of the Pennsylvania railroad bridge were carried away. The ice-dam extended slowly up the river until it reached the city, causing the water to reach high-water mark of 1881; 18th, the ice-dam broke, carrying away nearly all of the Cherry-street, Pennsylvania railroad, and Union bridges, and also damaging the Wheeling and Lake Erie bridge. The water, which had risen to such an extent as to submerge parts of the city, rapidly receded after the ice-dam broke. Ice continued running from the 19th to 23d.

Saint Clair river.—Port Huron, Michigan: 1st, teams are crossing on the ice between the American and Canadian shores at this place.

Detroit river.—Detroit, Michigan: 14th and 16th, ice moving out of river; 18th, river frozen; 19th, ice broken; 23d to 27th, large quantities of drift-ice.

Lake Michigan.—Grand Haven: 7th, the steamer "Michigan" was caught in the ice eighteen miles off this harbor and drifted to a point seven or eight miles west of the outer piers. The tug "Arctic" went to the assistance of the "Michigan" and was also caught in the field of ice which covered the lake for a distance of from fifteen to twenty miles westward. On the 9th, the "Arctic" forced her way out of the ice, but was again caught and carried back to her first position in the ice. 10th, the "Michigan" and "Arctic" drifted slowly westward with the ice, and were out of sight at 2 p. m. Both the tug and steamer were run into Muskegon harbor on the 11th, the former being slightly damaged. 12th, the steamer "Wisconsin" lies ice-bound at the month of Grand river. 13th, the "Michigan" and "Arctic" arrived at 12.30 p. m. The captain of the former reported that the ice encountered after drifting northeastward on the 10th surpassed any ever observed during his many years experience as a navigator on the lakes. The thickness of the ice was observed in places to be thirty feet, while the average thickness varied from fifteen to twenty feet. Captain McGregor, of the "Wisconsin," states that there are only about twenty-five miles of open water between Milwaukee, Wisconsin, and this port.

Little Bay de Noquet.—Escanaba, Michigan: bay remained frozen throughout the month.

Straits of Mackinac.—Mackinaw City, Michigan: 5th, the steamer "Algonah" arrived within two miles of the harbor, where she became fast in the ice, which is solid to the bottom in the shoal water.

Lake Superior.—Duluth, Minnesota: 17th, large field of ice moved out into the lake on this date.

Grand Traverse bay.—Traverse City, Michigan: 1st, bay frozen over.

Illinois river.—Havana, Illinois; 23d, at 9 a. m., about three hundred feet of solid ice passed down the river, doing but little damage. The ice still remains solid and extends over two miles up the stream,

Browning, Illinois: 23d, the ice in the river at this place is solid, with no prospect of breaking up.

Wabash river.—Lafayette, Indiana: 16th, the ice in front of the city broke on this date, crushing a number of small houses on the west side. There is a heavy dam at Goose island, seven miles below the city.

Mississippi river.—Alton, Illinois: 16th, the ice-dam at this place is over five miles in length; 22d, the upper dam moved about 11 a. m., carrying away about one-half of box factory on the river and submerging the building. The damage to machinery and building is estimated at from $8,000 to $10,000.

Keokuk, Iowa: 20th, ice started during the evening, but became stationary at sunset.

La Crosse, Wisconsin: 19th, ice in river twenty inches thick and shows no signs of breaking.

Saint Louis, Missouri: 2d, light ice running; 14th, river full of ice, and also on 17th and 18th; 19th, river clear of ice.

Cairo, Illinois: 13th, navigation between Saint Louis and this place opened to-day.

Muscatine, Iowa: 27th, teams are still crossing the river on the ice.

Ohio river.—Wheeling, West Virginia: 5th, floating ice.

Pittsburg, Pennsylvania: 4th, the dams in the various creeks at the head-waters of the Allegheny broke about noon, filling the river with large cakes of ice.

Cincinnati, Ohio: floating ice, 8th, 9th.

Missouri river.—Leavenworth, Kansas: 20th, ice shows signs of breaking; 22d, ice moved short distance; 24th and 25th, moved about half a mile; 26th, ice moved about one mile leaving the river clear opposite this station; 28th, the ice-dam below the city broke and moved out, causing a rapid fall in the river.

Kansas City, Missouri: 15th, ice broke in river, and continued running during the remainder of the month.

Lexington, Missouri: 16th, ice-dam broke at 4 a. m., causing no damage.

Hannibal, Missouri: 16th, the river is clear of ice for miles south of the Hannibal bridge, but above that point it is still intact.

Boonville, Missouri: 16th, the ice is very thick and badly dammed at this place.

Jefferson City, Missouri: 16th, ice has broken up and is passing in huge floes.

Willamette river.—Umatilla, Oregon: 1st and 2d, floating ice. 12th, river frozen above and below town; ice being from two to three feet thick. 24th, ice-dam in river at 3 p. m.

Portland, Oregon: 5th and 7th, much floating ice in river.

Kansas river.—Fort Riley, Kansas: 15th, ice broke up in river at 4 a. m., and continued running during the remainder of the month.

Miscellaneous.—West Las Animas, Colorado: 3d, the Arkansas and Purgatoire rivers, rapidly running streams near this place, are frozen to the bottom in many places.

Grampian Hills, Pennsylvania: 15th river free of ice.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors, at the Signal-Service stations, with the average depth at which the observations were made, are given in the following table. In this table are also shown the highest and lowest observed water temperatures of the month, with the monthly ranges, and the monthly mean temperature of the air for the various stations. At the following stations no observations were made during the month on account of ice: Alpena, Escanaba, Mackinaw City, Marquette and Detroit, Michigan; Buffalo, New York; Chicago, Illinois; Cleveland, Sandusky, and Toledo, Ohio; Duluth, Minnesota; Milwaukee, Wisconsin. Observations were also not made on account of ice at New London, Connecticut, from the 1st to 3d, and at Grand Haven, Michigan, from 1st to 26th.

Temperature of Water for February, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
	°	°	°	ft. in.	°
Atlantic City, New Jersey	39.0	34.9	4.1	6 5	35.1
Alpena, Michigan*					
Augusta, Georgia	61.0	50.0	11.0	9 4	56.7
Baltimore, Maryland	37.0	33.0	4.0	9 11½	39.1
Block Island, Rhode Island	35.6	31.8	3.8	8 6	32.1
Boston, Massachusetts	32.7	29.8	2.9	25 0	29.2
Buffalo, New York*					
Cedar Keys, Florida	78.0	60.0	18.0	8 5	66.9
Charleston, South Carolina	59.0	49.6	9.4	38 0	57.2
Chicago, Illinois*					
Chincoteague, Virginia	47.0	38.0	9.0	5 8	40.2
Cleveland, Ohio*					
Detroit, Michigan*					
Delaware Breakwater, Delaware	39.4	33.8	5.6	4 2	37.9
Duluth, Minnesota*					
Eastport, Maine	33.8	31.3	2.5	16 8	19.9
Escanaba, Michigan*					
Galveston, Texas	54.0	43.0	11.0	14 10	53.3
Grand Haven, Michigan†	29.0	29.0	0.0	19 0	23.6
Indianola, Texas	66.9	39.7	27.2	8 7	54.0
Jacksonville, Florida	71.0	60.0	11.0	18 0	64.3
Key West, Florida	78.0	73.3	4.7	16 8	75.0
Mackinaw City, Michigan*					
Marquette, Michigan*					
Milwaukee, Wisconsin*					
Mobile, Alabama	63.5	52.5	11.0	15 11	59.6
New Haven, Connecticut	32.8	30.1	2.7	14 4	27.6
New London, Connecticut†	36.0	33.0		11 10	30.4
Newport, Rhode Island	34.9	31.4	3.5	9 10	30.5
New York City	34.2	30.2	4.0	16 6	31.4
Norfolk, Virginia	52.0	43.0	9.0	16 9	46.8
Pensacola, Florida	67.7	56.7	11.0	17 7	60.9
Portland, Maine	31.5	30.0	1.5	18 11	25.7
Portland, Oregon	41.6	39.9	11.7	80 9	33.1
Port Eads, Louisiana	45.8	42.3	3.5	9 7	61.8
Provincetown, Massachusetts	34.5	31.0	3.5	14 0	29.7
Punta Rassa, Florida	78.0	65.6	12.4	11 2	70.7
Sandusky, Ohio*					
Sandy Hook, New Jersey	36.0	31.4	4.6	1 5	32.6
San Francisco, California	50.6	46.1	4.5	29 2	47.9
Savannah, Georgia	61.8	49.6	12.2	12 5	60.1
Smithville, North Carolina	51.0	46.0	5.0	10 0	52.1
Toledo, Ohio*					
Wilmington, North Carolina	59.0	46.0	13.0	13 0	54.7

*Frozen. †Observations incomplete. See text.

The largest monthly ranges of water-temperature are: Indianola, Texas, 27°; Cedar Keys, Florida, 18°; Wilmington, North Carolina, 13°; Punta Rassa, Florida, 12°.4; Savannah, Georgia, 12°.2. The smallest are: Portland, Maine, 1°.5; Eastport, Maine, 2°.5; New Haven, Connecticut, 2°.7; Boston, Massachusetts, 2°.9; Newport, Rhode Island, 3°.5; Port Eads, Louisiana, 3°.5; Provincetown, Massachusetts, 3°.5; Block Island, Rhode Island, 3°.8.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The most extensively observed display of the month occurred on the 24th. It was observed on the New England coast, and from the upper Mississippi valley westward as far as Oregon and Washington Territory.

The aurora of the 27th was observed in New England, the Lake region, and thence westward to Montana.

Extended displays occurred in the northwest on the 25th, 28th; and in northern New England on the 1st, 4th, 5th, 13th, and 28th.

The most southerly points at which auroras were observed during the month are Cape Hatteras, North Carolina, on the 14th, and Visalia, California, on the 3d and 4th.

The observer at Saint Vincent, Minnesota, reports auroras on the 1st, 2d, 6th, 20th, 24th, and 28th.

Numerous other displays, not here noted, were reported in the northern districts.

ATMOSPHERIC ELECTRICITY INTERFERING WITH TELEGRAPHIC COMMUNICATION, ETC.

Fort Davis, Texas, 11th.

Captain Vogelgesang, of the s. s. "Silesia," reports that, during the gales encountered between N. 50° 53′, W. 23° 00′, and N. 49° 41′, W. 32° 22′, from the 7th to 9th, the atmosphere was filled with electricity. The tops of masts, yards, and all iron stays were tipped with electric light, and a sudden aberation of the compass of 22½ points to the northward was twice observed, which disappeared with the extinction of the electric light on the yards and stays. There was also felt one heavy stroke of lightning, which went down the funnel, causing a blast of fire to come out of the funnel, and lighting the stoke-hole, steerage, and cabins with an electric light. It sounded like a heavy gunshot, but no thunder was heard. The electricity was most felt before the setting in of the squall.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories, as follows:—

Alabama.—Mobile, 23d, 24th; Auburn, 24th; Green Springs, 24th.

Arizona.—Fort Apache, 20th; Fort Grant, 20th; Prescott, 20th; Camp Thomas, 20th.

Arkansas.—Little Rock, 2d, 3d, 14th; Fort Smith, 3d, 4th.

California.—San Francisco, 13th; Sacramento, 14th.

Florida.—Pensacola, 9th, 24th; Jacksonville, 12th, 16, 18th.

Illinois.—Thunder-storms were reported from numerous stations throughout the state, as follows: 2d, 3d, 6th, 14th, 15th, 16th.

Indiana.—Logansport, 2d; Lafayette, 3d; Wabash, 3d; Laconia, 15th.

Indian Territory.—Fort Sill, 12th, 14th.

Iowa.—Thunder-storms were reported from numerous stations throughout the state on the 15th and 16th; at Fort Madison on the 2d, 3d, 23d; Burlington, 2d; Des Moines, 3d.

Kansas.—Reported by various stations throughout the state on the 3d, 13th, 15th, 16th, and at Creswell on the 21st.

Kentucky.—Bowling Green, 10th.

Louisiana.—Shreveport, 11th, 12th, 14th; Port Eads, 1st, 17th, 24th; New Orleans, 23d; Point Pleasant, 24th.

Massachusetts.—Worcester, 4th; Westborough, 4th.

Michigan.—Were generally reported throughout the state on the 15th and 16th; at Hillsdale, on the 14th; and at Otisville, on the 17th.

Mississippi.—Starkville, 12th, 16th; Vicksburg, 11th, 12th, 16th, 23d, 24th.

Missouri.—Were of general occurrence throughout the state on the 2d, 3d, 6th, 16th, 22d.

Nebraska.—Nebraska City, 16th.

New Hampshire.—New Market, 4th.

New Mexico.—Silver City, 20th; Santa Fé, 21st, 22d.

North Carolina.—Hatteras, 4th; Weldon, 4th; Kittyhawk, 7th, 17th; Highlands, 12th, 17th, 22d; Chapel Hill, 17th; Charlotte, 18th.

Ohio.—North Lewisburg, 2d; Westerville, 2d; Cleveland, 14th, 15th; Margaretta, 14th.

Pennsylvania.—Erie, 14th; Meadville, 14th.

Tennessee.—Chattanooga, 11th, 15th; Memphis, 16th; Nashville, 14th, 15th, 16th.

Texas.—Fort Concho, 13th, 16th, 23d; Fort Davis, 11th, 23d; Palestine, 14th, 16th, 23d; Brownsville, 16th; Indianola, 17th, El Paso, 20th; Mason, 20th; Galveston, 16th, 23d; Coleman City, Fredericksburg, Eagle Pass, Henrietta, Fort McKavett, and Uvalde, on the 23d.

Virginia.—Fort Monroe, 8th.

Wisconsin.—Were reported by various stations throughout the state on the 15th and 16th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts, as follows:—

New England.—1st, 2d, 5th, 6th, 9th, 10th, 14th, 15th, 20th, 22d.

Middle Atlantic states.—6th, 9th, 10th, 12th, 13th, 20th, 22d, 24th.

South Atlantic states.—4th, 15th, 22d, 25th, 26th.

Florida.—23d, 27th.

Western Gulf.—18th, 20th, 25th, 26th.

Ohio valley and Tennessee.—1st, 2d, 4th, 8th, 9th, 10th, 12th, 13th, 15th to 18th, 20th, 23d.

Lower lakes.—1st, 10th, 23d, 24th, 27th.

Upper lakes.—1st, 4th, 7th, 9th, 10th, 12th, 13th, 17th, 20th, 21st, 24th, 27th.

Upper Mississippi valley.—1st to 4th, 7th to 10th, 12th, 13th, 15th, 17th to 21st, 24th, 25th.

Missouri valley.—3d, 4th, 8th, 9th, 11th, 13th to 16th, 19th, 20th, 27th.

Northern slope.—2d, 5th, 7th, 10th, 13th, 17th, 24th.

Northern plateau.—1st, 5th, 6th, 7th, 9th, 19th, 21st, 27th, 28th.

Middle Pacific.—3d, 8th, 13th, 16th, 18th, 19th, 20th, 24th, 26th.

South Pacific.—8th, 9th, 11th, 26th, 27th.

Solar halos were also reported by the following stations not included in the districts named above:—

Albany, Oregon, 5th; Fort Buford, Dakota, 4th; Prescott, Arizona, 8th, 24th; Salt Lake City, Utah, 18th.

LUNAR HALOS.

Lunar halos have been observed in the various districts, on the following dates:—

New England.—1st, 13th, 14th, 19th, 20th, 21st, 24th.

Middle Atlantic states.—11th to 16th, 19th, 20th, 21st, 23d.

South Atlantic states.—11th, 13th, 14th, 17th, 21st, 22d, 23d, 25th, 27th.

Eastern Gulf.—11th, 21st, 22d, 25th.

Western Gulf.—3d, 16th, 17th, 19th to 22d, 25th.

Rio Grande valley.—13th.

Ohio valley and Tennessee.—11th to 16th, 18th to 24th.

Lower lakes.—10th, 12th, 13th, 17th to 21st.

Upper lakes.—12th, 13th, 15th to 23d.

Extreme northwest.—15th, 19th, 20th, 22d.

Upper Mississippi valley.—4th, 12th to 23d.

Lower Missouri valley.—11th, 13th to 16th, 18th, 19th, 20th.

Northern slope.—13th, 16th, 21st.

Middle slope.—12th, 15th.

Southern slope.—13th, 15th, 18th, 19th.

Southern plateau.—11th, 13th, 14th, 20th, 21st, 23d, 24th, 25th, 28th.

Northern plateau.—15th, 19th, 20th, 26th.

California.—6th, 11th, 13th, 17th, 18th, 19th, 21st, 23d, 25th, 26th.

Lunar halos were also reported from the following stations, not included in the districts named above:—

Pensacola, Florida, 11th, 21st.

Salt Lake City, Utah, 17th, 18th, 21st.

Portland, Oregon, 20th.

Albany, Oregon, 27th.

Grand Haven, Michigan, 13th, an unusually large lunar halo was observed, the diameter being 84°.

MIRAGE.

Wicklow, Dakota, 11th.—The village of Madison, eleven miles distant, was plainly visible. On the 28th, mirage was observed from 7 to 9.30 a. m., between south-southwest and west-southwest, and was very remarkable for its extent and distinctiveness. Buildings were seen with their surroundings apparently at elevations of from 100 to 1,000 feet. In some instances they appeared inverted, and again in their natural positions above the inverted images. They were constantly changing in altitude in places, while in others they remained stationary.

Fort Maginnis, Montana, 14th.—At 8.30 this morning various points on the Yellowstone were visible, although some of them were one hundred and fifty miles distant. The buildings and flags of a military post were plainly seen at this place, and were recognized to be Fort Custer, nearly two hundred miles away.

Huron, Dakota, 26th.—Mirage observed from 8 to 9 a. m. Houses ten miles distant, not ordinarily visible, on account of swells in the prairie, were clearly seen, having the appearance of two structures, one resting upon the other in an inverted position. The Wessington Hills and Ree Heights, at distances of twenty-five and fifty miles, respectively, appeared as lofty glaciers. Fields in which corn-stalks were left standing appeared as forests of lofty, leafless trees. Ice on the river, in a bend five miles away, ordinarily hidden from view by high bluffs, could be seen as a sheet of opaque glass, showing distinctly the bends in the stream, and glistened in the sunlight. On the 28th, from 8 to 9.30 a. m., Triquois, eighteen miles east, was plainly visible, although ordinarily hidden from view by swells in the prairie.

Similar conditions were also observed at the following stations:—

Salina, Kansas, 8th.

Pretty Prairie, Kansas, 8th.

Genoa, Nebraska, 3d, 5th.

Alexandria, Dakota, 5th, 25th, 28th.

Wicklow, Dakota, 7th, 25th, 27th.

Barnegat City, New Jersey, 4th.

Indianola, Texas, 6th, 17th, 18th, 19th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal-Service stations. Reports from one hundred and seventy-two stations show 4,779 observations to have been made, of which fifteen were reported doubtful; of the remainder, 4,764, there were 4,091, or 85.9 per cent., followed by the expected weather.

SUN SPOTS.

North Lewisburg, Ohio.—Mr. H. D. Gowey reports: Sun spots observed on all clear days during the month. They were the most numerous on the 8th, least numerous on the 25th, largest on the 15th, and smallest at close of the month. Magnetic variations on the 1st and 22d.

Port Eads, Louisiana, 15th.—A spot was observed on the sun's disc, slightly to the right of the centre, on this date.

The following record of sun spots for the month of February, 1883, has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:—

DATE—Feb., 1883.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 10 a. m...	1	10‡	0	0	1	5	4	20‡	
2, 11 a. m...	1	2	0	0	0	0	4	20‡	Spots probably disappeared by solar rotation.
5, 3 p. m...	1	3	2	10‡	1	3	3	15‡	
7, 3 p. m...	2	15‡	0	3	2	15‡	6	30‡	
8, 12 m....	0	0	0	3	0	0	6	25‡	
9, 1 p. m...	0	5	2	5	0	0	4	25‡	
10, 10 a. m...	0	0	0	0	0	0	4	25‡	
12, 11 a. m...	2	20‡	1	3	1	20‡	5	45‡	
13, 11 a. m...	0	10‡	0	0	0	0	5	55‡	
1 p. m...	0	0	0	0	0	0	5	55‡	
17, 4 p. m...	0	0	.....	.....	0	0	5	20‡	
18, 12 m....	0	0	0	0	0	0	5	20‡	
19, 12 m....	0	0	1	3	0	0	3	15‡	
20, 9 a. m...	0	0	0	0	0	0	2	10‡	
10 a. m...	0	0	0	0	0	0	2	10‡	
21, 9 a. m...	0	0	0	2	0	0	2	6	
3 p. m...	0	0	0	0	0	0	2	6	
22, 1 p. m...	0	0	0	3	0	0	2	3	
23, 10 a. m...	0	0	2	3	0	0	0	0	
24, 12 m....	1	2	0	0	0	0	1	2	
26, 9 a. m...	0	2	0	0	0	0	1	4	
27, 10 a. m...	1	3	0	0	0	0	2	7	
28, 9 a. m...	0	0	0	0	0	0	2	7	

‡Approximated. Faculæ were seen at the time of every observation.

METEORS.

Heath, Massachusetts, 1st.—A brilliant meteor was observed to pass from a point near the north-star toward the southwestern horizon, leaving a dazzling path, which cast shadows.

Chambersburg, Pennsylvania, 8th.—A meteor was observed at 9.25 p. m., passing due north in the western sky at an altitude of 15°. It moved slowly, leaving a train of alternating bars of light in its path.

Harvard College Observatory, Cambridge, Massachosetts, 8th—A meteor equal to "Arcturus" in brightness was observed at 11.15 p. m.

Punta Rassa, Florida, 8th.—At about 10.15 p. m. a brilliant meteor was observed in the eastern sky at about 20° above the horizon. It pursued a downward course, leaving no cloud or train. Its color was of a brilliant white, with a greenish tinge; it was visible about three seconds.

Springfield, Illinois, 22d.—A very bright meteor was observed at 6.15 p. m., moving from a point 45° west of north.

The s. s. "Bothnia," in N. 40° 54′, W. 66° 15′, at 10.30 p. m., 27th, observed a meteor of unusual brilliancy pass from north to south.

Olneyville, Rhode Island, 27th.—A brilliant meteor was seen in the western sky at about 10 p. m, which lighted up the surrounding country as far as the eye could reach. Its course was from northwest near the zenith toward southwest at the horizon. In appearance and color it resembled a huge electric light.

Other reports of this meteor are published elsewhere in the REVIEW in connection with the supposed earthquake which occurred at the time of its appearance at various points in Massachusetts, Rhode Island, and Connecticut.

Meteors of less brilliancy have been reported, as follows:—

Visalia, California, 7th, 9th, 18th, 21st, 23d.
Morrison, Illinois, 8th.
Fort Wayne, Indiana, 19th.
Vevay, Indiana, 27th.
Woodstock, Maryland, 24th.
Dudley, Massachusetts, 1st.
Umatilla, Oregon, 6th.
Austin, Tennessee, 27th.
Yuma, Arizona, 3d, 11th, 25th.
Monticello, Iowa, 8th.

EARTHQUAKES.

Bloomington, Illinois, 4th.—At 5 a. m., of this date, an earthquake shock was distinctly felt in this vicinity. A prolonged rumbling noise, lasting several seconds, was first heard, followed by a report and a shock which was generally observed in all parts of the town.

Kalamazoo, Michigan, 4th.—Between 4 and 5 p. m., an earthquake shock was felt south of this place, and at various points in southern Michigan and northern Indiana. The shock was sufficient to crack the windows of buildings, and loosen stove-pipes, etc.

Wolfborough, New Hampshire, 4th.—At 3.05 p. m., an earthquake was felt here, rattling windows, crockery, and articles of furniture. The movement was from west to east, lasting five seconds. Another slight shock was felt at 3.15 p. m. Previous to the first shock, it was perfectly calm, but instantaneously with the earthquake, the air was set in rapid motion, continuing so during the afternoon.

Cornish, Maine, 4th.—An earthquake shock was felt at this place at 3.16 p. m.

It is interesting to note that at or about the time of the occurrence of these shocks in the United States, earthquakes were also felt at different points in Europe. The following reports by cable were published in the "New York Herald" of February 6, 1883:—

Agram, Hungary, February 5, 1883.—A severe shock of earthquake was felt here last evening.

Madrid, Spain, February 5, 1883.—Renewed shocks of earthquake have been felt in Murcia.

On the 27th, a shock was generally felt in southern Rhode Island, southeastern Connecticut, and at points in Massachusetts, concerning which the following reports have been received:—

Connecticut.—Norwich, 27th: During the evening an earthquake shock, lasting from three to five seconds, was felt in this city. It was accompanied by a deep rumbling noise, and shook buildings in an alarming manner.

New London, 27th: Sergeant John G. Lynch, Signal Corps, U. S. A., reports as follows: "At 10.08 p. m., the residents in the northwestern part of the city and in a direct line from southwest to northeast, experienced a supposed shock of earthquake which was followed, about two seconds later, by a rumbling noise resembling the passing of a heavy train. The noise was heard throughout the city and vicinity, but the concussion was confined to a belt of less than one hundred and fifty yards in width and along the line described above. In neighboring towns, the impression that an earthquake shock had occurred was general, but it is worthy of note that the shock was scarcely felt except by persons within doors, and that the principal evidence of the earthquake was the rattling of doors and windows, which is commonly experienced during thunder-storms and in cases of violent explosions. This disturbance was in all probability due to the passage of a meteor of unusual size in close proximity to the earth. Simultaneously with the supposed earthquake shock, a large and exceedingly brilliant detonating meteor passed over this city from southwest to northeast. It was visible less than one second, and was described as a long streak of intense blue light, leaving no cloud at its disappearance."

Bristol, 27th: Two severe shocks, resembling an earthquake, were felt here at about 10.15 p. m. In certain localities, buildings were shaken, and the glass in windows and crockery rattled. The shock lasted from five to ten seconds.

East Greenwich, 27th: An earthquake shock was very sensibly felt about 10 p. m. At Coweset, a granite residence was so shaken as to spring a burglar-alarm. Two rumbles were heard, separated by an interval of about fifteen seconds.

Rhode Island.—Newport, 27th: A brilliant meteor was observed in the northern sky between 10.10 and 10.20 p. m., and was described as being about the size of a street-lamp, of greenish color, and passed toward the northeast, where it exploded. The noise caused by the explosion, was heard in all parts of the city, and was supposed by many to have been caused by an earthquake shock. Dishes rattled, globes were shaken from chandeliers, and a few windows were broken. Some persons report having experienced a tremulous motion

of the earth, but the effect was generally compared to that of a heavily loaded wagon passing over frozen ground.

Point Judith, 27th: At 10.15 p. m., an earthquake shock occurred lasting five seconds, accompanied by a rumbling sound; a second shock of less force was felt at 10.18 p. m., and a third, very feeble, occurred at 10.28 p. m. The movement was apparently from east to west.

Narragansett Pier, 27th: A severe shock of earthquake was felt at 10.15 p. m., accompanied by a low, rumbling sound, of fifteen seconds duration. All houses were badly shaken and the inhabitants frightened. A second, but less severe shock, occurred at 10.18 p. m., lasting five seconds; and a third shock, very light, of three seconds duration was felt at 10.28. The direction of movement was from east to west.

Block Island.—At 10.15 p. m. this island was visited by a severe shock of earthquake which lasted about eight seconds. It appeared to pass from the west, and when nearest produced a noise resembling that made by a passing train. Houses were badly shaken. The keeper of the Southeast Light reports that articles in the light tower were displaced by the shaking of the building. A second shock, very faint, was felt at 10.17 p. m. The captain of a pilot-boat, while off Fire island observed a large meteor at 10 p. m., passing from east to west. It was so brilliant, that a paper could have been read without difficulty from its light. The meteor was observed at Block Island just before the first shock was felt.

Massachusetts.—New Bedford, 27th: a shock of earthquake was felt here at 10.30 p. m., accompanied by a rumbling sound and tremor, resembling that caused by a heavily loaded wagon passing over frozen ground.

Heath, 27th: A light shock of earthquake was felt throughout the city at 10.20 p. m.

Fall River, 27th.—At 10.20 p. m., a noise was heard sounding like the firing of a heavy ordnance, and was accompanied by a vibration of the earth, causing windows, etc., to rattle.

Barrington, 27th.—An earthquake shock was felt at about 10 p. m., in various parts of the town, sufficient to shake buildings with considerable force.

California.—San Diego, 6th: a slight earthquake shock occurred here at 4.30 p. m.; the direction of movement was from north to south.

The bark "Siddartha," in N. 20° 04′, W. 67° 45′, on February 19th, at 7 p. m., experienced a sharp shock of earthquake which lasted about twenty-five seconds. The ship trembled as if dragging over a hard bottom; found no soundings at thirty fathoms.

SAND-STORMS.

Camp Thomas, Arizona, 2d, 19th.
Tucson, Arizona, 18th, 19th.
Yuma, Arizona, 2d, 4th.
Fort Yuma, California, 14th.
Fort Garland, Colorado, 1st, 2d.
Fort Union, New Mexico, 15th.
El Paso, Texas, 3d, 6th, 15th.

POLAR BANDS.

Los Angeles, California, 19th.
Wicklow, Dakota, 7th, 11th, 25th, 26th, 27th.
Washington, District of Columbia, 20th.
Augusta, Georgia, 3d, 8th, 25th.
Riley, Illinois, 20th.
Guttenburg, Iowa, 22d.
Keokuk, Iowa, 4th.
Yates Centre, Kansas, 1st, 5th, 21st.
Point Pleasant, Louisiana, 25th, 27th.
Gardiner, Maine, 17th.
Dudley, Massachusetts, 2d.
Lansing, Michigan, 6th, 9th, 21st.
Protem, Missouri, 1st, 12th, 20th, 25th, 27th.
Clear Creek, Nebraska, 12th, 21st.
Freehold, New Jersey, 8th.
Moorestown, New Jersey, 9th.
Rochester, New York, 6th.
Catawissa, Pennsylvania, 9th.
Nashville, Tennessee, 12th, 14th, 18th, 21st.
Palestine, Texas, 23d.
Marion, Virginia, 28th.
Wytheville, Virginia, 1st, 10th, 13th, 20th.

ZODIACAL LIGHT.

In the various states and territories, it was visible on the following dates:—

Arizona.—Prescott, 3d to 7th, 25th to 28th.
Connecticut.—New Haven, 7th, 8th, 25th, 26th.
Dakota.—Wicklow, 3d to 7th, 9th, 24th, 25th to 28th.
Florida.—Punta Rassa, 1st.
Georgia.—Augusta, 4th.
Illinois.—Springfield, 26th, 27th, 28th.
Indiana.—Wabash, 7th, 8th.
Iowa.—Cresco, 4th, 7th, 8th, 9th, 28th; Monticello, 1st, 5th, 8th, 9th, 27th.
Kansas.—Lawrence, 3d, 7th; Salina, 26th, 27th, 28th; Yates Centre, 7th, 25th.
Maine.—Cornish, 4th, 5th, 7th, 8th, 9th.
Massachusetts.—Cambridge, 1st, 5th, 7th, 8th, 9th, 23d, 25th to 28th; Rowe, 8th, 9th; Somerset, 5th, 7th, 8th, 26th, 28th.
Minnesota.—Northfield, 3d, 4th, 5th, 7th, 9th, 27th, 28th.
Nebraska.—Clear Creek, 7th, 24th to 28th.
Oregon.—Albany, 1st, 2d, 6to to 9th, 22d, 23d.
Pennsylvania.—Dyberry, 7th; Haverford College, 14th.
Tennessee.—Nashville, 1st, 2d, 3d, 8th, 25th to 28th.
Texas.—Fort McKavett, 28th; Palestine, 19th.
Virginia.—Variety Mills, 1st, 5th, 7th, 8th, 26th, 27th, 28th.
Wisconsin.—Franklin, 7th, 8th, 9th, 27th, 28th; Manitowoc, 27th.

PRAIRIE AND FOREST FIRES.

Little Rock, Arkansas, 1st.
Creswell, Kansas, 28th.
Independence, Missouri, 19th to 22d, 25th to 28th.
Protem, Missouri, 1st, 20th, 26th, 27th, 28th.
Coleman City, Texas, 2d.
Fort Concho, Texas, 1st.
Fort McKavett, Texas, 2d, 24th, 25th.
Fort Sill, Texas, 21st.

MIGRATION OF BIRDS.

Geese flying northward.—Sacramento, California, 19th; Fort Madison, Iowa, 17th, 27th; Swanwick, Illinois, 22d, 24th; Independence, Kansas, 21st; Yates Centre, Kansas, 27th; Salina, Kansas, 14th; Pretty Prairie, Kansas, 19th; Clear Creek, Nebraska, 22d, 26th, 28th; Genoa, Nebraska, 26th; Superior, Nebraska, 27th; Augusta, Georgia, 24th; Fort Sill, Indian Territory, 21st; Lewiston, Idaho, 22d; Portland, Oregon, 22d; Cape Mendocino, California, 21st. *Flying southward.*—Creswell, Kansas, 11th; Fort Riley, Kansas, 25th; Augusta, Georgia, 19th, 25th. *Flying west.*—Creswell, Kansas, 7th, 25th; Fremont, Nebraska, appearing in large numbers, 22d; Wellington, Kansas, appearing in large numbers, 25th to 28th.

Ducks flying northward.—Sacramento, California, 19th; Charleston, Illinois, 20th; Swanwick, Illinois, 22d, 24th; Yates Centre, Kansas, 21st, 23d, 26th, 27th; Fort Scott, Kansas, 28th; Clear Creek, Nebraska, 22d, 28th; Genoa, Nebraska, 27th; Toledo, Ohio, 25th. *Flying southward.*—Creswell, Kansas, 26th; Superior, Nebraska, 27th; Palestine, Texas, 11th; Wellington, Kansas, appearing in large numbers, 25th to 28th.

NOTES AND REMARKS.

NOTE.—The Chief Signal Officer has received a copy of the report of meteorological observations made at the Carson Observatory, Carson City, Nevada, during 1880, 1881, and 1882, by Mr. Charles W. Friend.

The following summary is taken from the "First Monthly Report of Weather Service for Tennessee," February, 1883:—

Station.	County.	Name of observer.	When observations began.	Maximum temperature.	Minimum temperature.	Rainfall.	No. of days on which rain or snow fell.	No. of clear days.	Dates of frosts.	Dates of snow.	Dates of thunder-storms.
Sailors' Rest	Montgomery	John Minor	16	.....	.....	15.00?	3	8	19,20,21	.....	...
Springville	Henry	H. A. Boden	10	67	18	3.16	7	2	.....	17,18	...
Tibbs	Haywood	J. A. Moore	22	.....	40	0.47	3	4	26,27	.....	...
Grassy Cove	Cumberland	Nettie M. Stratton	4	73	20	3.92	19	8	.....	.....	15
Manchester	Coffee	Wiley Hickerson	7	75	23	2.70	9	5	18,19,20 21	.....	...
Beech Grove	Coffee	B. F. Cheatham	1	78	25	4.09	17	...	.....	.....	...
Maryville	Blount	W. H. Henry	19	.....	.....	0.66	4	5	19-22,26 27	.....	...
McNairy	McNairy	J. H. Blakely	22	75	27	0.70	3	3	26,27,28	.....	...
Covington	Tipton	T. W. Roane, M.D.	16	80	20	2.55	4	5	19,20,21 26,28	.....	...
Little Sewell	McMinn	J. Zeigler	7	.....	.....	1.06	6	5	.....	.....	...
Bolivar	Hardeman	E. P. McNeill	16	78	20	2.40	4	6	25,26	.....	16
Alexandria	Smith	Irenus Beckwith	15	75	28	1.82	6	4	19,20,26 27	.....	...
McKenzie	Carroll	John Brown	10	70	22	3.25	5	8	12,13,19 20,25,26 27	.....	...
Huntingdon	Carroll	J. B. Ramsey, M.D.	14	76	19	1.16	6	7	20,21,26 27	.....	...
Waverly	Humphreys	D. R. Owen	1	80	19	8.04	16	7	6,7,23 26	.....	...
Milan	Gibson	M.D.L.Jordan, M.D	16	76	18	1.78	5	8	19,20,21 25,26,27	.....	...
Kingston Sp'gs	Cheatham	W. J. Inanman	17	.....	.....	.....	4	5	.....	.....	17
Flat Creek	Bedford	Wm. Hart	1*	74	24	3.43	16	...	19,20,21 26,27	.....	...
Troy	Obion	W. H. Caldwell	10	.....	.....	11.50?	9	...	.....	17	...
Gadsden	Crockett	M. T. Moore	10	.....	.....	5.19	8	...	.....	18	...
Benton	Pope	Jim Hood	19	.....	.....	0.98	3	4	20,21,26	.....	...
Hohenwald	Lewis	A. P. Grover	16	.....	.....	2.37	4	...	.....	17	...

* Observations of rainfall from 1st; others from 15th.

The following letter is also taken from the same report:—

BUREAU OF AGRICULTURE, STATISTICS, AND MINES,
Nashville, Tennessee, March 5, 1883.

To his Excellency, W. B. BATE,
Governor of Tennessee.

SIR: Deeming it my duty, as it was also my earnest desire to promote in every practicable way, the development of the great industrial interests of Tennessee, and especially her agricultural interests, upon which the prosperity of our citizens so largely depends, and being convinced that a more thorough and accurate knowledge of the climatic conditions of our state is necessary to a full development of our agricultural resources, I have established under the control of this bureau, and with the kindly co-operation of General Hazen, Chief Signal Officer of the U. S. Army, a system of Weather Service for Tennessee. General Hazen agreed to furnish the necessary rain-gauges, books of instruction and blank forms for reports as well as free envelopes for the transmission of reports and correspondence through the mails.

In pursuance of this plan about fifty stations for observations have been established during the past month and many of them have submitted reports of observations embracing generally the latter half of the month. An analysis of these peports is herewith submitted. Considering the blanks furnished by General Hazen as too complicated for use by observers without special training and a full supply of scientific instruments, I prepared a simpler form which is now being used.

It is regarded as very important that at least one of these stations should be established in each county of the state, to the end that the monthly reports, as they are tabulated and published at this office shall give a full history of the climatic conditions of each county during the preceding month.

The reports thus far submitted indicate both zeal and intelligence on the part of the observers, and there can be no doubt that the facts which they are enabled to report with their present limited facilities will be of immense advantage. I respectfully submit however that in order to enable them more fully to meet the necessities of their work it is important that they be furnished with some additional instruments; especially that each station have one dry and one wet-bulb thermometer, and one maximum and one minimum thermometer. With these instruments they will be fairly equipped for their work. As the observers give their labor gratuitously, and as the service so far as organized has cost the state nothing but an inconsiderable item for printing, I most earnestly suggest that an appropriation to supply these instruments would be a measure of wise economy. From correspondence I am enabled to state the cost of the designated instruments of standard make would be $16.25 for each county furnished, or an aggregate of $1,560 for the State. Respectfully,

A. W. HAWKINS,
Commissioner of Agriculture, Statistics, and Mines.

The following meteorological summary has been received from Mr. S. R. Thompson, Director of the "Nebraska Weather Service:"

BULLETIN FOR FEBRUARY, 1883.

This month was cold, with humidity above normal in the western, and below in the eastern, part of the state

Rainfall.—The average by sections was as follows: southeast, 1.00 inches; northeast, 1.07; southwest, 0.74; northwest, 0.84. Average for entire state, .96, which is slightly in excess of the usual amount.

Temperature.—The mean temperature of the air was 20°.3, which was almost exactly that of February, 1881, and about 6° colder than the mean of many years. Average of all noon observations, 27°.8.

The following are some of the maximum and minimum temperatures reported: -

Omaha, maximum, 51°.2; minimum, —24°.9.
North Platte, maximum, 52°.3; minimum, —29°.
De Soto, maximum, 52°; minimum, —22°.
Agricultural College, maximum, 61°; minimum, —22°.

Mean Relative Humidity.—Omaha, 66.5; North Platte, 74.4; Agricultural College, 76.6.

Wind.—Miles traveled: Omaha, 5,134; North Platte, 5.784; Agricultural College, 5,910.

Mean direction: Omaha, north; North Platte, west.
Greatest velocity: Omaha, 24 miles per hour; North Platte, 36 miles.

Miscellaneous.—Thunder and lightning at Peru on the night of the 15th.
Ice broke up in the Republican river on the 15th.
Wild ducks and geese seen at various places on the 15th.
Miss Flora Buck reports a beautiful halo with four parhelia on the 16th, at Red Willow.
Sowing wheat began in Buffalo county on the 28th.

The following extract is taken from "Science," of March 9, 1883:—

METEOROLOGY.

Thermal belts of North Carolina.—Professor J. W. Chickering read a paper on this topic, reciting the observations of Mr. Silas McDowell and others. The valley of the Little Tennessee river, in Macon county, is about 2,000 feet above tide. When the thermometer indicates a temperature of about 26° F., the frost extends about 300 feet in vertical height up the mountain sides, and there ceases, appearing again 400 feet higher. In the intervening belt, the most delicate plants remain untouched; and so sharp are the dividing-lines, that sometimes one half of a shrub may be frost-killed, while the other is unaffected. Following a tributary stream upward from the valley, one passes three mountain-barriers, and enters in succession three valleys, the highest of which is plateau-like, and 3,900 feet in altitude. The vernal zone appears in each valley, rising as the valleys rise, but somewhat less rapidly; so that in the highest it is only 100 feet above the plateau. In this frostless zone the Isabella grape not merely has ripened for twenty-six consecutive years, but is free from mildew, blight, and rust. In Polk county a similar belt is said to skirt the Tryon mountains, extending from 1,200 to 2,200 feet above tide. This is untouched by frost until the latter part of December, and is usually free from snow; while the mountains above and the valleys below are covered. The peculiar stratification of the air indicated by these statements merits scientific investigation.—(*Phil. soc. Washington; meeting Feb.* 24.)

ERRATA.

In the REVIEW for December, 1882, under the heading DEVIATIONS FROM MEAN TEMPERATURE, on page 13, the mean temperature at North Volney, New York, should read 25°.46, and not 45°.46; and the table of mean temperatures for Snowville, Virginia, should have been for Johnsontown, Virginia. On page 16 (same REVIEW), the table showing average rainfall at Snowville, should also have been for Johnsontown.

Chart I. Tracks of Low-Barometer Areas. February, 1883.

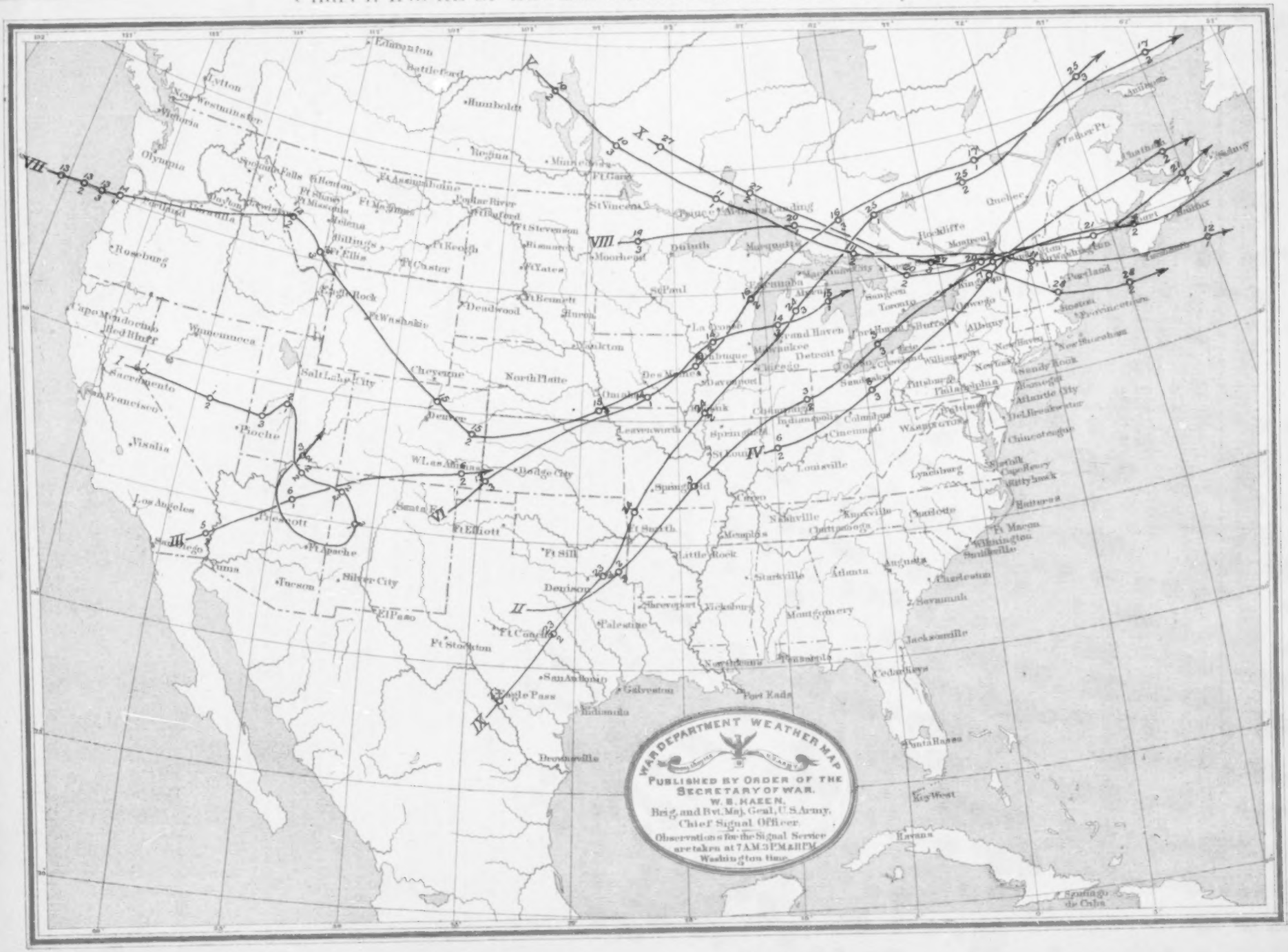


Chart II. Ocean Storm Tracks, February, 1883.

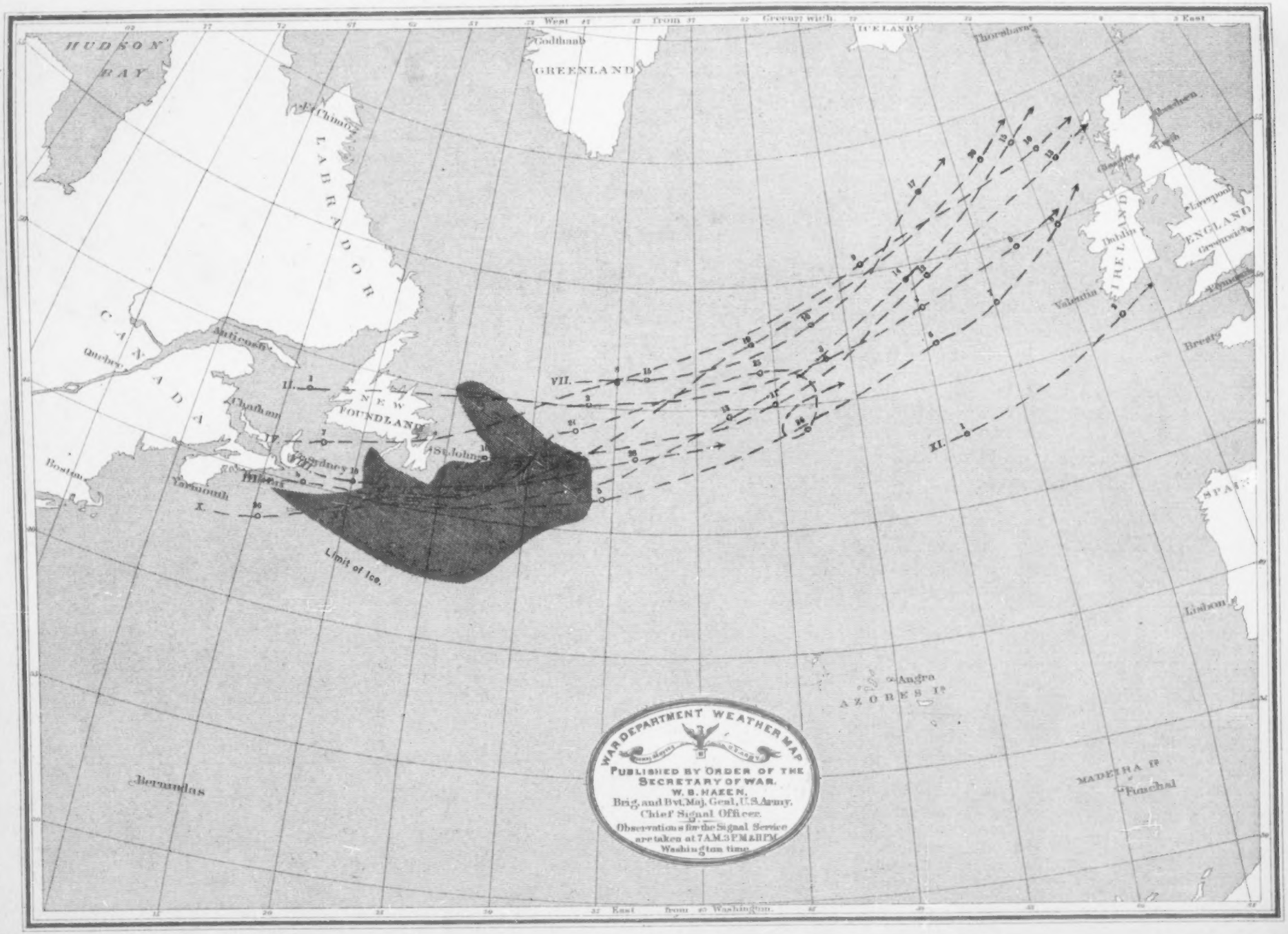


Chart III. Isobars, Isotherms, and Winds. February. 1883.

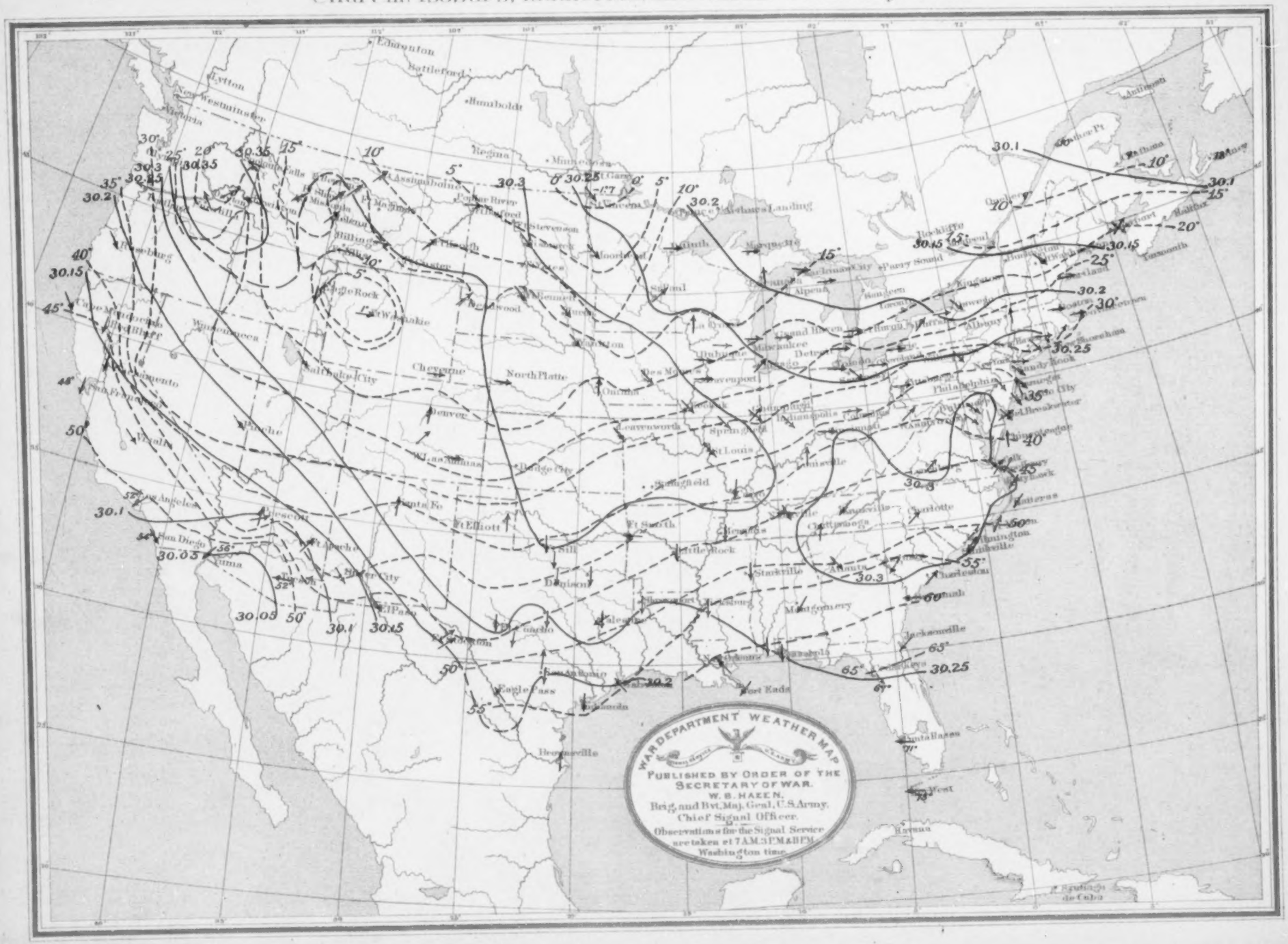
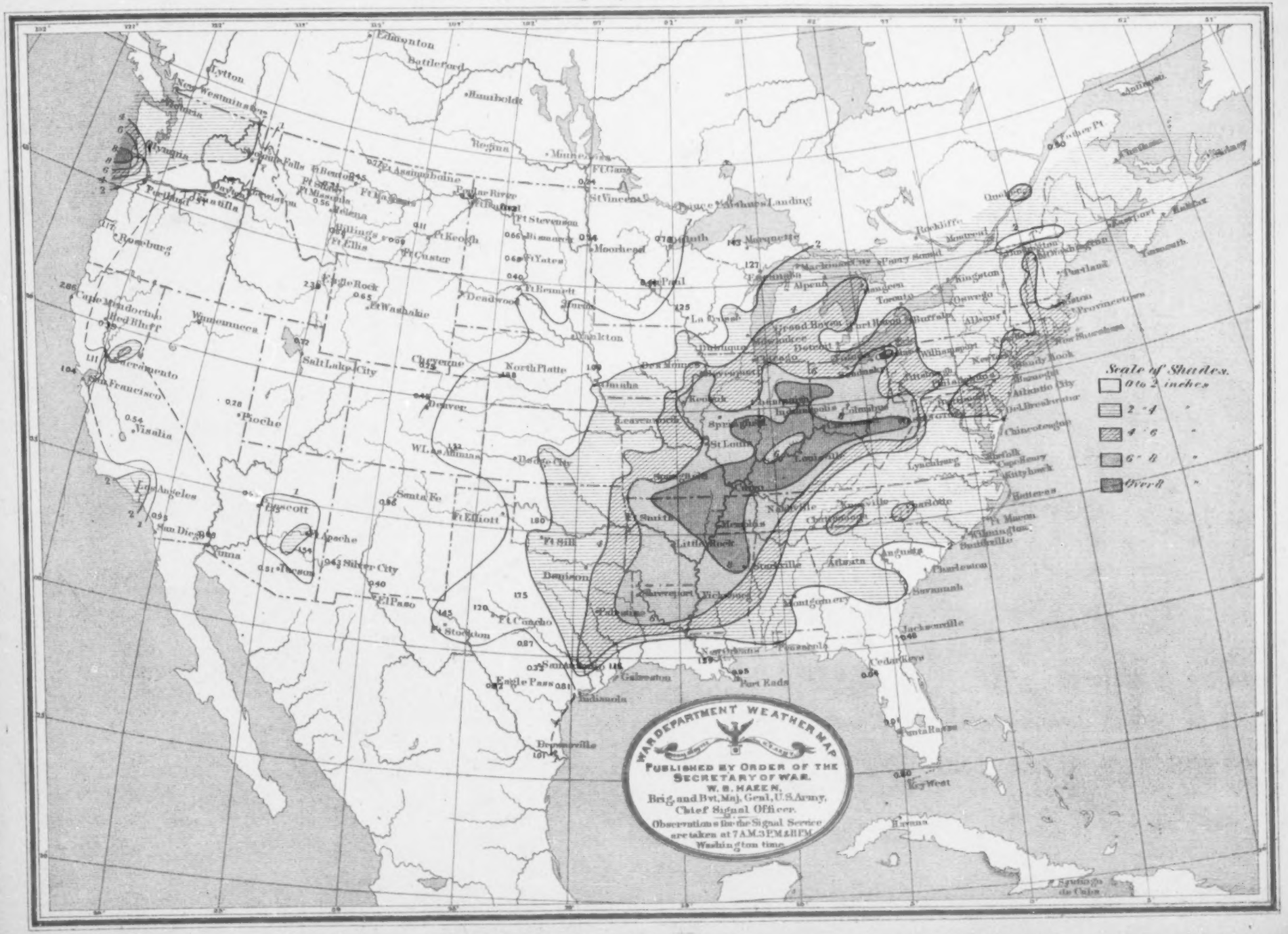

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U.S. Army,
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.

Chart IV. Precipitation, February. 1883.


Scale of Shades.
0 to 2 inches
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
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Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.

Voluntary observers of the Signal Service, on land, from whom meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for February, 1883.

Observer.	*Place of observation.*
Alden, L. P.	Coldwater, Mich.
Arden, Thos. B.	Garrison, N. Y.
Adriance, Chas. E.	Hector, N. Y.
Altaffer, J. M.	Independence, Kans.
Anderson, Dr. W. W.	Stateburg, S. C.
Abbott, Dr. E. K.	Salinas City, Cal.
Allen, Jos. H.	Ore Knob, N. C.
Andrews, Luman.	Southington, Conn.
Beloit College.	Beloit, Wis.
Bear, John P.	Boston, Mass.
Bryant, A. F.	Clear Creek, Nebr.
Bianchard, O. A.	Elmira, Ill.
Bell, Joseph	Franklin, Pa.
Bowen, F. W.	Humboldt, Iowa.
Brainerd, H. G.	Independence, Iowa.
Baker, Dr. Henry B.	Lansing, Mich.
Beall, Dr. R. L.	Lenoir, N. C.
Bullard, Ransom.	Litchfield, Mich.
Beal, William.	Murphy, N. C.
Beans, Thos. J.	Moorestown, N. J.
Brendel, Fred	Peoria, Ill.
Bentley, David	Princeton, Cal.
Bowman, Peter.	Ruggles, Ohio.
Boerner, Prof. Chas. G.	Vevay, Ind.
Bartlett, E. B.	Vermillion, N. Y.
Breed, J. E.	Embarrass, Wis.
Baldwin, A. L.	Bethel, Conn.
Bardsley, Jas. G.	Nephi, Utah.
Briggs, John.	Albany, Oreg.
Boggs, W. R.	Brevard, N. C.
Barney, Ahira	Bristol, N. H.
Benton, E. E.	Crete, Nebr.
Burton, Ava.	Mitchell, Ind.
Buck, Miss F. E.	Red Willow, Nebr.
Crane, Geo. W.	Bethel, Ohio.
Calhoun, P. B	Austin, Tenn.
Curtiss, G. G	Fallston, Md.
Cutler, B. B.	Heath, Mass.
Cocke, A. R	Indianola, Iowa.
Cutting, Hiram A.	Lunenburgh, Vt.
Crosier, Adam	Laconia, Ind.
Cheney, Wm.	Minneapolis, Minn.
Clayton, H. H.	Murfreesborough, Tenn.
Chappelsmith, John	New Harmony, Ind.
Chandler, Dr. W. J.	South Orange, N. J.
Caulkins, John S.	Thornville, Mich.
Clark, T. A.	Weldon, N. C.
Crump, M. H	Bowling Green, Ky.
Chandler, Chas. H	Ripon, Wis.
Cotton, Dr. D. B.	Portsmouth, Ohio.
Couch, E. D.	Contoocookville, N. H.
Coit, H. H.	Nora Springs, Iowa.
Crawford, D. F. G.	Leetsdale, Pa.
Coffin, Prof. S. J.	Easton, Pa.
Chase, Pliny E.	Haverford College, Pa.
Downs, Ed. C	Alexandria, Dak.
Dazey, J. B.	Charleston, Ill.
Day, Theodore.	Dyberry, Pa.
Dewhurst, Rev. E.	Dexter, Me.
Dickinson, Jas. R.	Guttenberg, Iowa.
Drake, W. T.	Marshall, Mich.
Davis, Jacob.	Rowe, Mass.
Doton, Hosea.	Woodstock, Vt.
Deming, Hiram D.	Wellsborough, Pa.
Dixon, Geo.	Hampton, Va.
Day, S. A.	Ossawatomie, Kans.
Dozier, Wm.	Mattoon, Ill.
Dodge, H. F.	Clinton, Mo.
Dawson, H. T.	Dudley, Mass.
Denker, A. H.	Los Angeles, Cal.
Edwards, Dr. C. E.	Archie, Mo.
Ellis, John.	Marquette, Nebr.
Elliott, J. C.	Swanwick, Ill.
Eisenberg, John C.	Warrenton, Mo.
Failyer, Prof. G. H.	Manhattan, Kans.
Fernald, Prof. M. C.	Orono, Me.
Farquhar, Allan	Sandy Springs, Md.
Gillingham, Warrington	Accotink, Va.
Grathwohl, John.	Blooming Grove, Pa.
Gillingham, Milnor.	Fallsington, Pa.
Gardiner, R. H	Gardiner, Me.
Gowey, H. D.	North Lewisburg, Ohio.
Gibson, John H.	Salina, Kans.
Green, Dr. Jesse C.	West Chester, Pa.
Gray, F. R.	Yates Centre, Kans.
Geddings, Dr. W. H.	Aiken, S. C.
Gerrish, S. H.	Sacramento, Cal.
Hurlin, Rev. Wm	Antrim, N. H.
Harvard College Observatory	Cambridge, Mass.
Hammitt, John W	College Hill, Ohio.
Heaton, Isaac E.	Fremont, Nebr.
Helm, Thos. B.	Logansport, Ind.
Hilton, John B	Paterson, N. J.
Hoskinson, R. M	Bainbridge Island, Wash.
Hunter, T. C.	Wabash, Ind.
Haywood, John.	Westerville, Ohio.
Hall, J. B	Worcester, Mass.
Hyde, G. A.	Cleveland, Ohio.
Hagensick, C. W	Lincoln, Nebr.
Hassler, B. K.	Chambersburg, Pa.
Harrison, Marcus.	Caldwell, N. J.
Hooker, P. J.	Milford, Nebr.
Hunt, John H.	Superior, Nebr.
Hasenstab, P. J	Washington, D. C.
Ingram, Dr. J.	Vineland, N. J.
Iowa Agricultural College.	Ames, Iowa.
James, John W	Marengo, Ills.
Josephs, W. B.	New Market, N. H.
Johnson, Thos. N.	Canal Dover, Ohio.
Jones, Ira B.	Neillsville, Wis.
Jackman, J. W.	Utica, Nebr.
Knight, G. W.	Inavale, Nebr.
Keese, G. Pomeroy	Cooperstown, N. Y.
Kuhn, F. W.	Fort Wayne, Ind.
Kimball, Perley R	Grafton, N. H.
Kent, Joseph C	Phillipsburg, N. J.
Kirkwood, E.	Glenwood, Ind.
Loomis, John C.	Jeffersonville, Ind.
Lueps, Miss Emma.	Manitowoc, Wis.
Lefavour, Henry.	Williamstown, Mass.
Loud, Prof. F. H.	Colorado Springs, Colo.
Lincoln, A. T.	Marion, Va.
McDonogh Institute.	McDonogh, Md.
Mell, Prof. P. H., jr.	Auburn, Ala
Martin, Horace.	Corning, Mo.
Marshall, Gregory	Cresco, Iowa.
McCready, Miss L. A.	Fort Madison, Iowa.
Meehan, Thos	Germantown, Pa.
Moore, C. R.	Johnsontown, Va.
Munn, A	Kalamazoo, Mich.
Maxwell, S. A.	Morrison, Ills.
Moulton, M. M	Monticello, Iowa.
Metcalf, Dr. John G.	Mendon, Mass.
Micklem, J. Howard.	Variety Mills, Va.
Morris, Rev. John	Morriston, Dak.
Mt. St. Mary's College.	Emmittsburg, Md.
Moore, Nathan.	Grampian Hills, Pa.
Newbegin, John D.	Anna, Ills.
Nelson, Dr. Wm. H.	Northport, Mich.
Nicholson, Mrs. M. M.	Otisville, Mich.
Neill, Thos	Sandusky, Ohio.
Newcomb, G. S.	Westborough, Mass.
Nourse, H. D.	Washington, D. C.
Noll, A. B.	Somerville, N. J.
Nutz, Leonard.	Fort Riley, Kans.
Osmond, Prof. I. T.	State College, Pa.
Owsley, Dr. J. B.	Jacksonburg, Ohio.
Prosser, Chas. S.	Ithaca, N. Y.
Pearce, Thomas	Eola, Oreg.
Parmelee, Francis D.	Hillsdale, Mich.
Payne, Prof. W. W.	Northfield, Minn.
Partrick, J. M.	North Volney, N. Y.
Parmelee, J. B	Nebraska City, Nebr.
Purdue University.	Lafayette, Ind.
Pierson, Rev. J.	Ionia, Mich.
Penhallow, D. P	Mountainville, N. Y.
Quarterman, Fred	Flushing, N. Y.
Richardson, Chas. F.	Freehold, N. J.
Remington, C. V. S.	Fall River, Mass.
Rose, O. E.	Highlands, N. C.
Rogers, Jesse D	Friendship, N. Y.
Reeves, Dr. Jas. S.	East Tawas, Mich.
Reinsch, August	Lawrence, Kans.
Richardson, E. S.	Read City, Mich.
Rocheleau, W. F	Randolph, Vt.
Rodman, Thos. R.	New Bedford, Mass.
Runge, C	New Ulm, Tex.
Robertson, T. D.	Rockford, Ills.
Russell, Geo. W	Wellsburg, W. Va.
Raffensperger, Dr. E. H.	Marion, Ohio.
Ross, W. J.	Pretty Prairie, Kans.
Rusk, Col. Sam'l E	Bordentown, N. J.
Sadler, H. E., B. A.	Emporia, Kans.
Shriver, E. T.	Cumberland, Md.
Seltz, Chas	De Soto, Nebr.
Scott, Thos. G.	Forsyth, Ga.
Stienecker, H. E.	Franklin, Wis.
Stucky, Dr. C. T.	Helvetia, W. Va.
Stern, Jacob T.	Logan, Iowa.
Snow, Prof. F. H.	Lawrence, Kans.
Smith, F. S.	New Brunswick, N. J.
Spilman, J. J.	Pierce City, Mo.
Slade, Elisha	Somerset, Mass.
Slenker, Mrs. E. D.	Snowville, Va.
Scribner, H. F. J.	Strafford, Vt.
Shriver, Howard.	Wytheville, Va.
Sweeney, A. B	Polo, Ills.
Smith, H. D.	Monticello, Iowa.
Snell, S. C.	Amherst, Mass.
Starky, Nathan.	Stockham, Nebr.
Trembly, Dr. J. B.	Oakland, Cal.
Tutwiler, H., L.L.D.	Green Springs, Ala.
Todd, David P.	Amherst, Mass.
Teele, Rev. A. K.	Milton, Mass.
Truman, Geo. S	Genoa, Nebr.
Turnbo, Silas C.	Protem, Mo.
Tillinghast, C. B.	Albany, N. Y.
Turner, Ernest	Point Pleasant, La.
Vermillion, W. W.	Curryville, Mo.
Venable, Prof. F. P.	Chapel Hill, N. C.
Voegeli, Adolphus.	Des Moines, Iowa.
Van Inwegen, Chas. F.	Port Jervis, N. Y.
Williams, Rev. C. F.	Ashwood, Tenn.
Wing, Miss M. E	Charlotte, Vt.
West, Silas.	Cornish, Me.
Whitney, C. E.	Creswell, Kans.
Watson, Evan.	Fort Scott, Kans.
Went, E. C.	Frankfort, Ky.
Watters, Dr. Jas.	Holton, Kans.
Williamson, J. A.	Johnstown, N. Y.
Wylie, Wm.	Mount Forest, Canada.
Whittington, Granville.	Mount Ida, Ark.
Walton, J. P	Muscatine, Iowa.
Wait, S. E.	Traverse City, Mich.
Woodstock College	Woodstock, Md.
Wolfe, John H	Wellington, Kans.
Washburn College.	Topeka, Kans.
Washington Aqueduct	Receiving Reservoir, D. C. Distributing Reservoir, D. C. Great Falls Reservoir, Md. Rock Creek Bridge, D. C.
Wilson, W. E.	Cedar Rapids, Iowa.
West, Dr. Jos. O.	Princeton, Mass.
Winipiseogee Lake, Cotton and Woolen Manufacturing Co.	Weir's Bridge, N. H. Woodstock, N. H. Wolfborough, N. H. Lake Village, N. H. Bristol, N. H. Belmont, N. H. Ashland, N. H.
Wild, Rev. E. P.	Newport, Vt.
Wadsworth, Dr. J. L. R.	Collinsville, Ill.
Willis, O. R., A. M., Ph. D.	White Plains, N. Y.
Williams, A. C.	Elk Falls, Kans.
Wise, W. S.	Meadville, Pa.
Whitcomb, Dr. G. G.	Ogreeta, N. C.
Yetter, Wm. G	Catawissa, Pa.
Yates, T. P.	Factoryville, N. Y.
Young, Geo. R	Penn Yan, N. Y.
Zimmerman, F. C.	Bunker Hill, Ills.
Zimmermann, Irving S.	Wicklow, Dak.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for February, 1883.

Abraham Lincoln, Fort, Dak.	Bowie, Fort, Ariz.	Hamilton, Fort, N. Y.	Monroe, Fort, Va.	Presidio of San Francisco, Cal.	Sully, Fort, Dak.
	Bidwell, Fort, Cal.	Klamath, Fort, Oreg.	Meade, Fort, Dak.		Sisseton, Fort, Dak.
Adams, Fort, R. I.	Buford, Fort, Dak.	Leavenworth, Fort, Kans.	Mount Vernon B'ks, Ala.	Randall, Fort, Dak.	Totten, Fort, Dak.
Alcatraz Island, Cal.	Bridger, Fort, Wyo.	Lowell Fort, Ariz.	Maginnis, Fort, Mont.	Reno, Fort, Ind. T.	Union, Fort, N. Mex.
Angel Island, Cal.	Canby, Fort, Wash.	Lyon, Fort, Colo.	Niagara, Fort, N. Y.	Snelling, Fort, Minn.	West Point, N. Y.
Apache, Fort, Ariz.	Columbus, Fort, N. Y.	Lewis, Fort, Colo.	Niobrara, Fort, Nebr.	Stevenson, Fort, Dak.	Washakie, Fort, Wyo.
Assiniboine, Fort, Mont.	Concho, Fort, Texas.	Mason, Fort, Cal.	Pagosa Springs, Cal.	Shaw, Fort, Mont.	Wingate, Fort, N. Mex.
Barrancas, Fort, Fla.	Ellis, Fort, Mont.	Madison Barracks, N. Y.	Plattsburgh Barracks, N. Y.	Stevens, Fort, Oreg.	Yates, Fort, Dak.
Benicia Barracks, Cal.	Garland, Fort, Colo.	McDermitt, Fort. Nev.	Preble, Fort, Me.	Saint Augustine, Fla.	Yuma, Fort, Ariz.
Brady, Fort, Mich.	Hale, Fort, Dak.	McHenry, Fort, Md.			

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for February, 1883.

Missouri State Weather Service, under direction of Professor Francis E. Nipher, Saint Louis, Mo. (Names of co-operating observers not given.)
Indiana State Weather Service, under direction of Mr. J. B. Conner, Indianapolis, Ind. (Names of co-operating observers not given.)
Tennessee State Weather Service, under direction of A. W. Hawkins, Commissioner, Nashville, Tenn.
Extracts have been used from records of the Central Pacific and Southern Pacific railways.

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